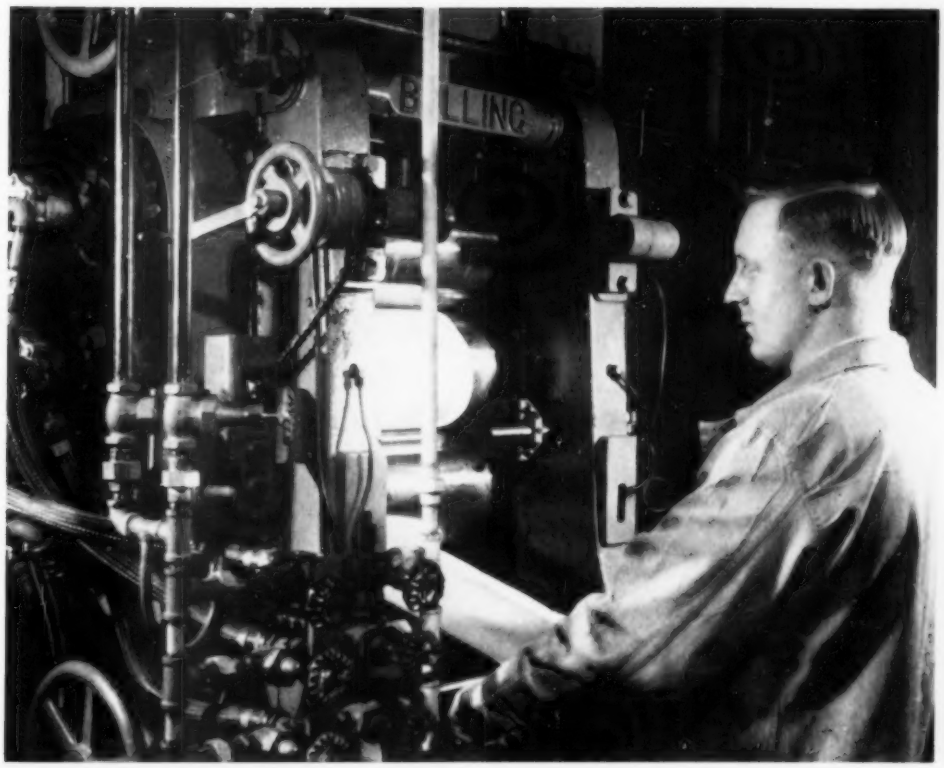


A Four-Roll Laboratory-Model Calender in use at Battelle Memorial Institute. Paper is being coated with the resin (vinyl or polyethylene) in thicknesses of .002 to .010. Studies are being made to determine the most suitable method for processing with particular attention being paid to temperature and speed.

PUBLISHED BY THE SOCIETY OF PLASTICS ENGINEERS, INC.

Section Notes

CHICAGO

A Joint Meeting of SPE-S.P.I. was held Wednesday, February 8th at the Builders Club, 228 N. LaSalle Street, Chicago, Ill. The Speaker was Jean Reinecke of J. O. Reinecke & Associates Industrial Designers. "Styling To Suit the Public" was the subject.

CONNECTICUT

"Polystyrene Molding" was presented February 10th at the Hotel Barnum, by Mr. William Shenney, Technical Service Division of the Dow Chemical Company.

DETROIT

On Friday, March 3 at the Rackhan Memorial Building, Dr. Gilbert Thiesen of Koppers Company, Inc., Pittsburgh, Pennsylvania, spoke on "Raw Materials for the Plastics Industry." He used lantern slides along with his talk.

WESTERN NEW ENGLAND

Mr. L. J. Morrison, Vice President in charge of Sales and Advertising of Detroit Mold Engineering gave a talk on "What's New in Mold Making" at the March 1st meeting held at the Hotel Sheraton in Springfield, Mass.

SOUTH TEXAS

"Problems of the Injection Molder" was presented at the March 15th meeting by Mr. Thomas E. Orr. Mr. Thomas E. Orr is Vice President of Plastic Engineering, Inc., Cleveland, Ohio. Mr. Orr, Honorary Life Member of S. P. E. and former National President, is making a tour of the southern sections of S. P. E., including Mexico. The Ship Ahoy Restaurant, 6628 S. Main St., Houston, Texas was the meeting place.

On Monday, February 13th, the Rohm & Haas Co. opened its Plexiglas Store Show in Studio "A" of the Shamrock Hotel. Mr. F. W. Tetzlaff talked on "Acrylic Plastics in Architecture". Mr. Tetzlaff, a graduate of Dartmouth, has been with Phillips Baker Rubber Co., U. S. Rubber Co., and is now Assistant Sales Manager of Rohm & Haas Co. The Store Show is on national tour of 12 cities and has been well received throughout the U. S.

ROCHESTER

Rochester Section Meeting was held Feburary 20, 1950 at the Redmen's Club, Rochester, New York. Mr. Robert Prisch, Allerton Chemical Co., Rochester, New York, spoke on synthetic resins in surface coatings with particular emphasis on nitro-cellulose, ethyl-cellulose, cellulose-acetate, cellulose - acetate - butyrate, vinyl, organosols, acrylics, alkyds, melamines, ureas, phenolics, and styrene. The role of plastic in surface coatings was emphasized. A review of properties of specific plastics and combinations of plastics and their influence on the properties of surface coating films was presented. Newer developments in finishes were outlined and some projected developments were reviewed.

EASTERN NEW ENGLAND

The March meeting was held on Thursday, March 2 at the Hotel Vendome. The speaker of the evening was Carl N. Beetle, president of Beetle Boat Company of New Bedford. Not satisfied with conventional material and boat building technique Mr. Beetle turned to the infinite possibilities of low-pressure laminating with polyester resins. Mr. Beetle's speech was on Glass Fibers + Polyester Resins + Engineering equal Boat Building. A short film on a subject of interest was also shown.

NEWARK

The Newark Section met at the Newark Athletic Club in Newark, New Jersey February 8th to hear Mr. George W. Jargstorff speak on "Polyethylene." Mr. George W. Jargstorff is with the Development department of Bakelite.

The March meeting of the Newark Section of the Society of Plastics Engineers was held at the Military Park Hotel on March 8. Mr. William Whitehouse of Crown Machinery and Tool Co. spoke on "Preplasticizing of Injection Materials". In addition, there was a forum composed of a materials man, a molder, and a tool man, who answered questions from the floor on various phases of molding and mold-building.

UPPER MIDWEST

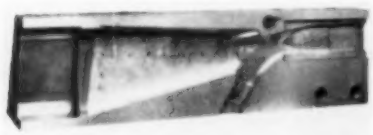
On Monday, February 13th Mr. Stanley R. Melvin, of Technical Service Department, Monsanto Chemical Co., presented the subject of improving the performance of polystyrene moldings through annealing. Slides of the annealing process along with molded examples were shown.

At the last meeting in January, Mr. Hanna of Hercules Powder Co. gave an excellent lecture on "Cellulosics". His lecture dealt with the subject of cellulose acetate vs. polystyrene in competition. He stressed the advantage of acetate in flame resistant applications and for shock resistant, large size moldings. Tne movie dealt with the vast scope of cellulose production, markets, research, development, and quality control.

ST. LOUIS

"Recent Developments in Cellulosic Plastics" was presented at the Tuesday, February 25th Meeting of the St. Louis Section by Mr. Russell D. Hanna, Plastics Promotion Manager of Hercules Powder Company, Wilmington, Delaware. Mr. Hanna also showed a film by Hercules Powder Co., to illustrate his talk.

GUN STOCK MOLD—



Unusual because of size, shape and nature of piece. An unusual combination of techniques was required to engrave the hob, hob the knurled hand grip section, and Keller machine the cavity.

DESIGNED AND BUILT . . . by Parker
CRAFTSMEN SINCE 1871

Representing Parker in
RHODE ISLAND • VERMONT
MASSACHUSETTS • MAINE
NEW HAMPSHIRE
M. A. SIEBERT CO.
43 Leon St., Boston 15, Mass.
GA — 70104

THE PARKER ORGANIZATION
with *Complete Facilities* for fine Mold Making . . . Machines and Craftsmen, is equipped to Engineer, Design and Build any plastic mold or to work to your specifications.

If you require the *FINEST QUALITY WORKMANSHIP* from start to finish . . . efficient prompt service, backed by years of *EXPERIENCE* —
WRITE: The Parker Stamp Works, Inc. Dept. 6, 650 Franklin Avenue, Hartford, Conn. — ASK FOR CATALOG No. 49 —

SPE JOURNAL

Mar., 1950
Vol. 6, No. 3

Published monthly except July and August by the
SOCIETY OF PLASTICS ENGINEERS, INC.
409 SECURITY BANK BLDG.
ATHENS, OHIO

Dr. Jesse H. Day, Editor

Editorial Advisory Board: MARIO PETRETTI, J. H. DUBOIS, WAYNE PRIBBLE, CARL J. FROSCH

Advertising Representatives: Ortgies & Dillon, 155 East 44th St., New York 17, N. Y.; William R. Stewart, 9 South Clinton St., Chicago 6, Illinois.

30 cents a copy **$3.00 a year**

Entered as second-class matter at the Post Office at Athens, Ohio.

INDEX

ARTICLES

page

WHAT'S NEW?—An Industry Report on the New Materials and Machines 3

PROFESSIONAL ACTIVITIES REPORT
- Pin-Point Gating 10
- Quality Control 12
- Automotive 13
- Plastic Film 15

NEWS OF THE SECTIONS

Buffalo, 16; Central Ohio, 17; Chicago, Front Cover; Cleveland, 18; Connecticut, Front Cover; Detroit, Front Cover; Eastern New England, Front Cover and 18; Golden Gate, 17; Miami Valley, 16; Newark, Front Cover, 2 and 9; New York, Front Cover and 2; Northwestern Pennsylvania, 16, 18; Philadelphia, 18; Quebec, 16; Rochester, Front Cover; St. Louis, Front Cover and 9; South Texas, Front Cover; Toledo, 18; Toronto, 17; Western New England, Front Cover and 9; Upper Midwest, Front Cover.

ADVERTISERS

- ABA Tool and Die Company 8
- Art Roll Leaf Stamping Company 1
- Miskella Infra-Red Company 13
- Parker Stamp Works, Inc. ..... Front Cover
- Rogers Plastic Corporation 2
- Standard Tool Company 1
- Worcester Stamp Company 17

The Society of Plastics Engineers Journal is not responsible for the views expressed by individual contributors. All material submitted must be received not later than the fifth of the month for publication in that month. Communications should be addressed to Dr. Jesse H. Day, Society of Plastics Engineers Journal, Athens, Ohio.

Plastic Marking Specialists
for
Molders and Fabricators

Polyethylene Marking In All Colors Now a Specialty

We contract to TRADE MARK or DECORATE all THERMOPLASTIC and THERMOSETTING products.

You can take advantage of our outstanding engineered HOT STAMPING METHOD. This below the surface process, simulating engraving, surpasses other methods such as decals, silk screening and wiping-in. It is accomplished in any and all colors regardless of shape or size of the item. It is cleaner, has sharpness of outline, wears longer and is performed more economically. Our facilities are the largest in the country, and we contract to do any marking required regardless of quantity. We invite your inquiries and if pieces are available please include same.

Free Pick Up and Delivery in Metropolitan New York Area

ROLL LEAF ART STAMPING CO.
"MARKING SPECIALISTS"
3510 Palisade Ave. Union City, N. J.

Plastic or Celluloid Fabricating Equipment

1 FOOT TOGGLE PRESS
2 POWER JIG SAW
3 BEVELER
4 HAND LEVER PRESS
5 DEGATOR
6 ELECTRIC STEAM TABLE

STANDARD TOOL CO.
84 WATER STREET, LEOMINSTER, MASS.
Outfitters to Plastics Mfrs. Since 1911
OMNI PRODUCTS CORP., Export Distributors, New York, N.Y.

POLYTHENE IS NEWARK TOPIC

By JACK R. PECTAL

The **NEWARK SECTION** of the Society of Plastics Engineers held their regular dinner meeting on Wednesday, February 8th, 1950 at the Military Park Hotel in Newark. The meeting preceded by a cocktail hour, was presided over by Section President, Dr. R. B. Akin.

After a brief business session Dr. Akin turned the meeting over to Peter Simmons, substituting for Program Chairman Joe Meyer, who in turn introduced the speaker for the evening, Mr. George Jargestorff of the Bakelite Corporation.

Mr. Jargestorff presented an extremely interesting and factual discussion of Polyethylene from its development to its current predominating usage in the container and coating field. Through the use of excellent slides, Mr. Jargestorff pointed out the physical properties of the various types of Polyethylene correlated with their molecular weights and concluded with molding techniques and shrinkage control on this relatively new thermoplastic.

This material has been a comparatively recent development in the United States plastics industry, the Bakelite Company and the Du Pont Company pioneering the initial developments about ten years ago. Some work had been done in England in 1933, but the requirement of high pressure equipment had retarded its progress in that country. At present, several major projects utilize the bulk of available production, these being molded and fabricated bottles, the coating of paper with a 10 to 15 mils deposit, and the molding of food containers for refrigerator use.

In the molding of polyethylene, a variation in shrinkage from .010 to .030″ per inch can be obtained by varying the molding conditions. As a rule, high heating cylinder temperatures together with maximum injection pressure and a cold mold, tend to give a lower shrinkage coefficient. At times the use of a filler of carbon black is necessary to control shrinkage to the degree desired.

The meeting adjourned with a bull session centered around Mr. Jargestorff and the many and varied Polyethylene applications which he had brought along.

Mr. Joseph E. Meyer, General Electric Company, has moved to 570 Lexington Avenue, New York 22, New York.

Jersey Plastics and Die Casting Company, has moved to 145 Shaw Avenue, Irvington, New Jersey.

Newark Die announces the installation of a new Keller Machine type BG1 with a cutting capacity of 5 feet by 3 feet by 18 inches deep.

BINDMAN AT NEW YORK TALKS ON "SAFETY IN ILLUMINATED PLASTICS"

By ARTHUR M. MERRILL

A very interesting talk on "Safety in Illuminated Plastic Articles," by Stanley Bindman, ex-president of the Section and formerly director of manufacturing for Noma Electric Corp., featured the February 15 dinner meeting of the New York Section. The meeting was held at the Hotel Shelburne and attended by approximately 55 members and guests of the group.

Mr. Bindman noted that during the past 12 years more than 100,000,000 illuminated plastic Christmas tree ornaments have been sold, and that complaints or troubles during this time have been negligible. During Christmas of 1948 some fire officials received complaints from users of certain ornaments that they smoked and melted. On the basis of insufficient tests, owing to the short time available, these fire officials decided that the ornaments were dangerous and publicized this decision.

In the early part of 1949 a meeting was called under the auspices of SPI and included representatives of plastic material suppliers, ornament manufacturers, the National Board of Fire Underwriters, and others. A committee was formed to thoroughly investigate the problem. It was found that the number of ornaments that melted, or emitted smoke, or otherwise behaved abnormally, was only a minute percentage of the total number sold and were the result of either a defective electric lamp operating at higher than normal temperature; inadequate ventilation of the ornament; or improper design of the ornament.

It was found that in no case where a complaint was received did the ornaments actually cause a fire. In addition, samples sent to various testing and underwriters laboratories were given ratings as being non-hazardous. To insure prevention of further complaints, corrective measures have been disseminated to the various manufacturers by the SPI. These measures provide for: (1) electrical testing of all lamps to eliminate those operating at too high temperatures; (2) modifying the shape and contour of ornaments to provide more air space between lamp and plastic wall; (3) adding additional vent holes and slots to the plastic housing to permit quicker heat dissipation; (4) eliminating adhesives completely, or else using more fire resistant adhesives; and (5) eliminating blue and green colors in certain ornaments because these colors tend to hold more heat. In addition to these measures, Noma is also using only heat resistant thermoplastics in their ornaments to further reduce the possibility of fire hazard.

In the business session preceding the talk, Section president Sam Silberkraus, consultant, announced that Mr. Bindman has become president of Gemloid Corp. and will completely reorganize that company, and that Jim Murphy, formerly with Bakelite Corp., has joined Synvar Corp. A report was heard from secretary-treasurer George Baron, Ideal Plastics Corp., and from the new membership and attendance committee chairman Robert Boucher, Durite Division of Borden Co. Bruno Wessinger, Wess Plastic Molds, Inc., will continue as chairman of the house committee for the first six months of 1950, assisted by Charles Kleiderer, Ideal Plastics Corp., who will then take over for the next six months. Similarly, G. Palmer Humphrey, consultant, is continuing as program committee chairman for the first six months of 1950, prior to turning over his duties to the new chairman, Winslow Ward, American Cyanamid Co. A progress report was also given by Mr. Bindman in his capacity as co-chairman of the 1951 national conference committee, formed by the New York and Newark Sections.

Table favors were distributed through the courtesy of Washington Molding Co. (Nicholas Fasano) and Price-Driscoll Corp., and the meeting closed with a drawing for door prizes contributed by Carpenter Steel Co. and "India Rubber World."

The next meeting, on March 15 at the Hotel Shelburne, featured a talk on "Dry Coloring of Polystyrene" by Sanford E. Glick, Monsanto Chemical Co.

Rogers Plastic Corporation Offers Manufacturers' Molding Service and Ideal Distribution Arrangement

The management has been in the plastics industry since its pioneer days.

Rogers Plastic Corporation

West Warren, Mass.

A new guide to the selection, installation and servicing of oil and gasoline hose has been published by the New York Belting and Packing Co., 1 Market St., Passaic, N. J.

Data are furnished on the principal types of hose used for delivery service to homes and industrial buildings, airport refueling, curb pump hose for filling stations, heavy duty hose for barge, dock and sea loading operations and hose for the handling of propane and butane, liquefied petroleum gases.

WHAT'S NEW?—Industry's Report on Progress

Edited by J. H. DuBOIS

Your S.P.E. National Office sent out over 400 letters to the suppliers of the plastics industry as follows:

We wish to prepare an improved or "new" materials story for the SPE JOURNAL. *For this story we wish to present a summary of the 1949 developments as follows:*

1. *Description of materials or improvements.*
2. *Use and competitive significance. (Where does it fit the general picture and why?) Strong points and weak points.*
3. *Table of properties—include price/cu.in.*
4. *Adaptability to present equipment.*
5. *Materials dropped or obsoleted during 1949.*
6. *New material developments that may be introduced in 1950.*
7. *New molding or fabricating equipment that is needed to expedite progress within the industry.*

If you have any doubt about whether or not your materials data is new and of general interest, please submit the data. All data will be given serious consideration by a capable group of engineers in order to make this presentation of maximum value to the industry.

The returns were edited to provide S.P.E. members with a condensed summary of the most important data that were submitted. Engineering progress results from making advanced use of new materials and methods. It is believed that every plastics engineer will find interesting and valuable information in this report.

1. NEW MATERIALS INTRODUCED IN 1949

BAKELITE DIVISION
UNION CARBIDE AND CARBON CORPORATION
30 East 42nd Street,
New York 17, N. Y.

A summary of new products prepared at the specific request of Mr. J. H. DuBois, National Director of the Society of Plastics Engineers for publication in the S.P.E. Journal.

Vinylite Molding Materials

Applying pin point gating techniques in molding elastomeric vinyl compounds, an investigation shows that pin-point gating where the gates are 15 to 40 mils in diameter, solve much of the problem of consistently producing a uniform gloss and a surface free from dull spots. Even low-cost, medium filled (20%) industrial compounds show an improvement in gloss. Similarly, fill-out is improved in a large number of cases. In addition, this investigation has shown the advisability of having the gate open into a thin section and of having the gate aim at an obstruction. The plastic will therefore hit the obstruction promptly after it enters the cavity and a better molding results.

A Vinylite compound was introduced as a non-marring elastomeric material for deep freezer gaskets. The special properties of this compound are non-marring characteristics, good low temperature flexibility, resistance to cold and to cracking, good low temperature impact strength and long life.

A new rigid injection molding compound was introduced. This material possesses increased heat resistance as well as the dimensional stability and low mold shrinkage (0.1%) of the other rigid Vinylite molding compounds. This compound features easier moldability, and tolerates molding temperatures as high as 330°F.

Vinylite Extrusion Materials

During the year, an extrusion compound was developed for use as a very low cost glossy material for extruding fender welts. This compound possesses good outdoor life.

A number of Vinylite extrusion compounds for electrical insulating purposes were introduced.

VG-5911 is a general purpose insulating material for building wire types of applications and has been listed by Underwriters' Laboratories as suitable for Type T, Type TW and for use when exposed to oil up to 60°C. VG5911 possesses high DCR (5×10^6 megohm-cm @ 50°C.), excellent low temperature flexibility (stiffness at zero degree C. is only 20,000), high deformation resistance at elevated temperatures (per cent deformation from 500 gram load at 120°C. is only 15%), and a minimum odor.

VG-9031 is a low-cost electrical insulating compound and is listed as being suitable for type T, type TW and exposure to oil at 60°C. This compound makes possible TW singles in non-metallic sheathed cables.

Still another compound possesses outstanding non-marring and high temperature aging characteristics for use in special cord and jacketing types of applications. This compound exhibits excellent non-marring ability and it is expected that the results of field trials being conducted at this time will show that wire insulated with this compound does not mar varnished or lacquered surfaces or articles molded from polystyrene or other plastics.

Coloring of Natural Compounds

An important trend in the extrusion industry is blending of dry colorants or coloring master batches with natural colored Vinylite plastic compound in granular form. In this process the colorants and granules are tumbled in steel drums until blended. The mixture, fed directly to the extruder, produces a product comparable to purchased colored compounds. The chief advantage is simplification of inventories and ability to combine requirements so as to purchase one plastic compound at volume price.

Vinylite Resins

Plastisols based on Vinylite brand resins can be slush or dip molded to give elastomeric articles possessing very complex shapes and very thin inserts such as are beyond the mechanical tolerances of standard molding equipment and mold design. A plastisol is a dispersion of resin particles in a high molecular weight liquid plasticizer such as di-(2-ethylhexyl) phthalate. Plastisols are converted to tough, flexible elastomers by heating

(Next Page Please)

Contributors:

1. Bakelite Division Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, New York
2. Chemical Department, General Electric Co., Pittsfield, Mass.
3. Durez Plastics & Chemicals, Inc., North Tonawanda, New York
4. Monsanto Chemical Company, Springfield, Mass.
5. Rohm & Haas Co., Philadelphia, Pa.
6. B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, Ohio
7. Dewey and Almy Chemical Co., Cambridge, Mass.
8. Marbon Corporation, Gary, Indiana
9. Dow Chemical Co., Midland, Mich.
10. F. J. Stokes Machine Co., Philadelphia, Pa.
11. The Baldwin Locomotive Works, Philadelphia, Pa.
12. The Aldrich Pump Co., Allentown, Pa.
13. Hedwin Corporation, Baltimore, Md.
14. New Jersey Machine Corp., Hoboken, N. J.
15. J. M. Nash Company, Milwaukee, Wisc.
16. American Wheelabrator and Equipment Co., Mishawaka, Ind.
17. Wyssmont Company, Long Island City, New York
18. Watlow Electric Mfg. Co., St. Louis, Mo.
19. American Hydrotherm Corp., New York, N. Y.
20. Cincinnati Milling and Grinding Machine, Inc., Cincinnati, Ohio

to 350°F. for a short period of time. This technique of molding requires a minimum of capital investment and allows molding of very delicate cross sections with fine inserts. Similarly, plastisols or other dispersions are used to coat paper and cloth. An improved type of resin, Vinylite dispersion resin NV.3, was also introduced for plastisol use.

Vinylite Film & Sheeting

The most dramatic film development is the introduction of a new compound for use in window shades. This new compound possesses all the usual properties such as crack resistance, flame resistance, tear resistance, wear resistance and washability as well as increased light stability and wrinkle resistance. Although sunlight is very detrimental to most organic materials, it is believed that this new compound will withstand sunlight to an extert sufficient to compete favorably in one of the largest household furnishing markets in the United States. The plastic film may be handled on conventional equipment and presages to give paper and coated cloth corsiderable competition.

Bakelite Polyethylene Plastics

Because few additives are required in compounding polyethylene plastics, the developments in formulating and compounding for polyethylene in 1949 were limited. One development was that of filled compounds, fillers being incorporated in the plastic to increase its stiffness. Another development was the introduction of non-dripping flame retardant polyethylene electrical insulating compounds. Pure polyethylene resins burn slowly in a manner similar to paraffin waxes, but these new polyethylene compounds show marked resistance to burning.

Bakelite Styrene Plastics

BMS-7 is characterized by as high a heat distortion point as is available today in straight polystyrene, and has outstanding clarity in the crystal form. Pieces molded from BMS-7 will withstand limited amounts of boiling in water without distortion.

BMS-8 is a lubricated version of BMS-7. Molding properties are excellent.

Several special types of polystyrene are offered, including materials specifically prepared for the production of monofilaments and for the production of sound records. In each case, the products have many desirable properties for their specific end uses. These materials are available in limited production quantities.

Bakelite C-11—Molding Materials

A new rigid thermoplastic which is still a research project in many ways is now available in small quantities for field evaluation.

Bakelite C-11 is an acrylonitrile copolymer for injection molding and extrusion applications. It resembles polymethylmethacrylate and polystyrene in general characteristics, more closely than it resembles the cellulosic products. The tensile and flexural strengths of C-11 are about 45% higher than those of polystyrene and slightly higher than those of the methacrylates.

The new acrylonitrile copolymer is very clear with a slightly yellow cast. In terms of total white light transmission this cast is equivaleat to a 4% reduction in the light that would pass through a completely colorless material. Some of the deeper shades of transparent red, amber, green and blue C-11 material have optical properties equivalent to the methcrylates. The lighter transparent tints show the presence of yellow in the base polymer. Practically all of the opaque colors are possible with the current C-11 material.

Copolymer C-11 has a higher ASTM heat distortion than polystyrene but it should not be considered as a boil resistant material. Properly molded C-11 pieces shrink less than during 30 minutes in boiling water than do the so-called "heat resistant" polystyrenes. This property varies widely with molding conditions. Instances may be found where well molded polystyrene is more acceptable from the standpoint of heat resistance than is improperly molded C-11.

Some of the other useful characteristics of C-11 copolymer are good weather resistance, resistance to common household cleaning solvents, to soaps and detergents, to oils, fats, coffee and tea, to orange and lemon peel oils, and to some cosmetics as hand lotions and cream cake powder. The new material is not resistant to perfume tinctures.

C-11 is not compatible with polystyrene, polymethylmethacrylate, polyethylene, the vinyls, nylon, or the cellulosic materials. It presents all of the contamination problems of a distinctly different material when it is taken into a molder's plant.

C-11 is available in limited development quantities and larger amounts will probably be available during the first quarter of 1950.

C-11 is seriously considered for those applications where other transparent and translucent thermoplastic materials are used; and a few applications where color is not important but where the type of solvent resistance associated with the acrylics is desirable. The advantages of C-11 are easier moldability and lower cost than the acrylics.

Copolymer C-11 is desirable for high quality drafting instruments where faithful reproduction of mold surfaces, dimensional stability, and scratch resistance are important considerations.

The cosmetic applications include containers and closures for powders, emulsions and pastes where the essential oils are mixed with non-voltaile diluents.

C-11 can be used to advantage in many household items where available materials are too expensive or do not give acceptable performance. It is an excellent material for coffee cups, bowls, orange juicers, and brush backs.

Bakelite Phenolic Molding Materials

Six new phenolic molding materials of the general-purpose types were introduced in 1949. These new materials all are characterized by very fast rates of curing. BM-64 Black, BM-65, Brown, and BM-93 Black are wood flour filled general-purpose materials which possess curing rates 25 to 30% greater than former materials. Electronic preheating is used with these materials with very good results.

The three other general-purpose materials which were introduced possess a still faster rate of cure. These materials have curing rates 15 to 45% faster than former materials. These compounds are described below.

BM-18750 Black is a general purpose molding material with exceptionaly fast speed of cure, high gloss and excellent mold release. The extremely fast curing, 15 to 45% faster than other fast curing materials, makes this material somewhat critical in molding behavior. The material was developed for compression and plunger molding in positive and semi-positive molds and is offered in the flow range of 50 to 120, although slightly higher molding pressures may be required for equivalent flow. The high hot rigidity of this compound is of advantage for minimum warpage, but limits its usefulness in stripping operations.

BM-18752 Brown is a general-purpose material with exceptionally fast speed of cure, high gloss and excellent release. The extremely short curing time, 15 to 45% faster than previous fast curing materials, makes this material somewhat critical in molding behavior. The material was developed for compression and plunger molding in positive or semi-positive molds is offered in the flow range to 50 to 130, although slightly higher molding pressures may be required for equivalent flow. This material also possesses excellent rigidity at elevated temperatures.

BM-18751 Black is a general-purpose bleed proof material with exceptional fast speed of cure, high gloss and excellent release. This material possesses the same fast curing rates of BM-18750 Black and BM-18752 Brown. It was developed for compression and plunger molding in positive and semi-positive molds and is offered in the flow range of 50 to 130. This material possesses a high rigidity at elevated temperatures.

Laminating and Bonding Materials

1. Honeycomb sandwich construction panels—a combination of honeycomb core, adhesive, and two rela-

tively dense faces or skins—are light in weight yet strong and rigid. The core is a cellular structure resembling a bee's honeycomb. The cells are formed by walls of thin sheeting material such as cloth, paper or glass fiber impregnated with Bakelite phenolic resins, aluminum or steel foil. Practically any material may be used as facings on a honeycomb core. The most common are thin plywood, wood veneers, laminated plastic sheet, aluminum, stainless steel or porcelain enamelled steel.

2. Bakelite resin impregnated paper board used as crossband for furniture, flush doors, and plywood panels. Such a board is strong, relatively inexpensive, and has excellent making properties for hiding defects in undercores. This product is finding wide acceptance in quality case goods furniture.

3. Wallboards and moldings of wood aggregate (chips, sawdust, wood flour) bonded with Bakelite resins constitute a new practical industrial material utilizing common waste products. Wood waste boards are homogeneous, have high physical strength characteristics and are relatively inexpensive compared with some types of plywood and lumber. They can be nailed, sawn, and worked on regular wood shop equipment.

Discontinued Materials

During the year Bakelite Division discontinued the production of liquid phenolic casting resins as well as articles cast from these resins. Liquid phenolic resins had been cast into knife handles, shaving brush handles, and similar articles which simulated natural materials in appearance.

The Future

Relative to the future of the molding industry, two immediate developments appear to be needed: a further development and efficient use of preheating techniques, and a method for producing molds at a substantially lower cost.

About 70-75% of the total volume of phenolic molding materials used in the industry today utilize preheating equipment and it is expected that as equipment and handling techniques are improved, a substantial improvement in quality and a marked reduction in molding costs will be realized. The use of electronic preheating introduces many economies in the manufacture of moldings by transfer molding methods and it is expected that further progress will be achieved in this field.

The molding industry, both thermoplastic and thermosetting, will profit from a technique for producing high quality, accurately finished, low-cost molds. What would be most desirable would be a technique for producing high quality molds at nominal cost. Metal casting techniques and the use of special alloys have reduced the cost of molds to some extent, but the expense of hand finishing a mold to close tolerances still discourages many entrepreneurs.

2. RUBBER—PHENOLIC MOLDING COMPOUNDS

During 1949, General Electric introduced a "family" of rubber-phenolic bonded molding powders which were primarily designed to incorporate in the materials greatly increased abuse resistance which has heretofore been unobtainable with standard phenolics.

Standard properties are listed below. However, to better illustrate the "abuse resistance" of these new molding materials, additional information is reported which more accurately shows the capabilities of these materials to withstand severe abuse in service.

DROP HAMMER (SERVICE) TEST RESULTS of PHENOLIC vs. PHENOLIC-HYCAR MOLDING POWDERS

GE-12490 Woodflour-filled Phenolic vs. GE-12487 Woodflour-filled Rubber Phenolic.

	12490	12487
Izod, ft. lbs./in. notch	0.36	0.56
Drop hammer increasing		
height to crack, ft. lbs.	0.924	3.330
to break, ft. lbs.	1.508	9.480
Drop hammer fatigue energy		
to crack, ft. lbs.	0.714	4.800
to break, ft. lbs.	3.340	37.935

GE-12401 Cotton Flock filled Phenolic vs. GE-12808 Cotton Flock-filled Rubber Phenolic

	12401	12808
Izod, ft. lbs./in. notch	0.66	1.00
Drop hammer increasing		
height to crack, ft. lbs.	1.621	4.129
to break, ft. lbs.	5.540	14.340
Drop hammer fatigue		
to crack, ft. lbs.	0.521	13.050
to break, ft. lbs.	7.650	51.610

GE-12444 Fabric-filled Phenolic vs. GE-12809 Fabric-filled Rubber Phenolic

	12444	12809
Izod, ft. lbs./in. notch	1.30	2.30
Drop hammer increasing		
height to crack, ft. lbs.	3.155	10.290
to break, ft. lbs.	10.030	33.930
Drop hammer fatigue		
to crack, ft. lbs.	1.767	13.856
to break, ft. lbs.	15.546	*84.210

*not completely destroyed

GE-12431 Asbestos-filled Phenolic vs. GE-12494 Asbestos-filled Rubber Phenolic

	12431	12494
Izod, ft. lbs./in. notch	0.30	0.40
Drop hammer increasing		
height to crack, ft. lbs.	0.421	3.140
to break, ft. lbs.	0.421	6.500
Drop hammer fatigue		
to crack, ft. lbs.	0.480	0.997
to break, ft. lbs.	0.480	7.900

3. LOW PRESSURE COMPOUND

Durez 13527 low pressure molding material was developed for special applications requiring exceptionally low molding pressures. In compression molding, this material requires less than one-third of the normal pressure which is generally used for soft general-purpose materials.

Considering the possibilities of compression molding, for example, if it is desirable to mold a cabinet 24" x 24" x 24" depth in regular soft general-purpose material, it would require approximately 1600 tons pressure, provided of course that the material is preheated by high frequency, and the mold closing time is approximately 15 seconds from the time of material contact with the force. Molds for this pressure have to be substantially built, which means more metal, more machining, costlier hardening, and difficult handling. Producing the same size cabinet from this low pressure Durez molding material, only slightly more than 500 tons pressure would be required.

Low pressure molding material offers many advantages in transfer and molding. Since the material requires considerably lower plunger pressures, it will be possible to mold larger areas in the present equipment. For example, in transfer molding, the molding area is governed by the available clamping pressure. If general-purpose material is being used at 8000 psi, the maximum safe area which can be molded in a 200-ton press would be 45 square inches. Since Durez 13527 will successfully transfer mold at less than 1500 psi, an area of over 200 square inches can be molded in the same equipment.

Intermediate Pressure Molding Compound

Durez has also introduced 19646 Phenolic compound. This is an intermediate-pressure material of the general purpose type. Pressure requirements are about halfway between 13527 low-pressure material and soft 791 general-purpose material. Excellent physical and electrical properties. Good surface finish. Wood-flour-filled. Black.

4. RESINOX 1023 HEAT RESISTANT PHENOLIC

A new high heat resistant black molding powder gives high surface gloss and temperature resistance.

In tests, handles molded from this heat-resistant material have withstood exposure to temperatures ranging from 400 to 500°F. for a 240 hour period during which the temperature was raised from the lower to the higher level. In another test, the pieces were transferred directly from room temperature to the hot oven without any evidence of blistering. This is a severe test and one which will frequently cause blistering in the best grade heat-resistant materials.

Resinox 10900 Fast Curing Electrical Grade Phenolic

A low-loss material combining superior electrical loss properties with excellent moldability and fast cure. This material is suitable for a wide variety of communications parts and television components requiring low electrical loss characteristics at high frequencies.

PROPERTIES:

Specific Gravity: 1.71
Dielectric Strength @ 60 Cycles:
S/T 400 to 450 vpm
S/S 350-440 vpm
Power Factor @ 1 MC: 0.010 to 0.011
Dielectric Constant @ 1 MC: 4.10 to 4.20
Water Absorption: 0.03% by weight
Shrinkage: 0.003 to 0.004 inch/inch

5. PLEXENE TA.

This new styrene base copolymer offers very high impact strength, (5 ft. lbs, Izod notched), good dimensional stability, heat stability up to 183°F, gasoline resistance, good electrical properties and weathering characteristics.

The high impact strength of this thermoplastic compound permits the injection molding of nearly unbreakable products with dimensional stability not found in other thermoplastics having similar high impact resistance.

6. GEON 121 DESIGNED FOR USE IN BOTH ORGANOSOL AND PLASTISOL TYPE FORMULATIONS

Geon 121 is a straight polyvinyl chloride type resin of high molecular weight possessing the outstanding characteristics associated with straight polyvinyl chloride polymers. The abrasion resistance of products made from it is generally superior to that of other vinyl polymers. Physical properties of Geon 121 resin are briefly as follows:

Appearance ..... fine white powder
Specific gravity ..... approx. 1.4
Particle size ..... 1.5 microns avg.
Cost ..... 37c per lb. ($. 0187/in. 3)

Geon 121 has been so manufactured that no grinding is necessary and a plastisol compound may be prepared by simple stirring. It is possible to prepare fluid pastes containing less plasticizer than had previously been considered practical. This means that the hardness range of paste compounds has been greatly extended because of this new resin.

It is possible to prepare extremely soft stocks which are not easily handled on milling or Banbury equipment. It also is possible to prepare products of 95 Durometer A hardness and above.

The average Geon 121 plastisol is readily useable for a time period in excess of a year. Because the molecular weight of Geon 121 is higher than most polyvinyl chloride resins, the general physical properties and especially the abrasion resistance of finished products made from it are considerably improved.

Darex High-Styrene Copolymer Is Versatile

7. DAREX—HIGH STYRENE COPOLYMERS DAREX COPOLYMERS IN PLASTICS PRODUCTS

The unique characteristic of DAREX Copolymer X34 is its ability to impart hardness and resistance to abrasion and flex-cracking in combination with **flexibility** and **resilience.** For this reason it is useful in plastic products where a semi-rigid thermoplastic material is needed having greater toughness and reduced brittleness.

DAREX Copolymers have been used alone in plastic products as well as in combination with polystyrene to improve resistance to impact, to make polyethylene less brittle, and with other materials. Up to the present time they have been either injection or compression molded.

Supplied in granular or fine powder form DAREX Copolymers can be blended in tumblers. They can be mixed with colors and pigments on a hot mill or in a Banbury mixer. DAREX Copolymer X34 is of especial interest where liquid plasticizers are not desirable. Its low specific gravity means more molded products per pound of material and reduced shipping expense. DAREX Copolymer No. 3 is available where a more flexible material is desired.

At the present time DAREX Copolymer X34 is supplied in its natural amber color and is of primary interest to molding powder manufacturers and to molders who can mix their own molding materials.

8. MARBON 8000 MODIFIED STYRENE RESIN

MARBON 8000 is used with natural or synthetic rubbers for non-marking shoe soles, floor and wall tile, and miscellaneous mechanical rubber goods. The strong point of the MARBON 8000 resin over the high styrene resins on the market at present, is that the former has a lower softening point in the unvulcanized state which makes it easier processing and enhances mold flow. These properties are obtained with no loss in surface hardness and with actually an increase in the so-called "dead" feel which is desirable in vulcanized soles and floor tile. It is compounded with rubber and molded by conventional rubber processes.

9. STYRON 671 IMPROVED HEAT RESISTANCE STYRENE

Styron 671 is a new rigid thermoplastic which has properties similar to regular types of Styron except for better heat resistance.

Styron 671 can be molded in conventional equipment and in most conventional molds. It generally requires 50-75° higher molding temperature than Styron 666.

It has been found that one of the most imformative tests for measuring heat resistance of housewares and toys is a "practical heat distortion" test. This test consists of immersing the molding in a liquid bath and increasing the temperature 2°F. for every step of the test. The molding is immersed for at least two minutes depending upon the section thickness. It is then removed and checked for distortion. Sometimes templets are used to obtain accurate checks on dimensions. When

the first visible distortion is noted, the temperature indicated is considered the practical heat distortion.

Styron 671 under such tests has resulted in measuring cups having a heat distortion around 215°F., drinking mugs around 230°F., bath tub toys 226°F., coffee cups 220°F. By way of comparison, Styron 683 coffee cups show a practical heat distortion of 208°F.

In spite of the fact that its heat distortion is high it cannot be guaranteed as boilable or even recommended for prolonged or repeated boiling. Laboratory tests and field tests have shown that if a molded piece is highly strained it is almost impossible to prevent some distortion, surface checking or crazing on prolonged boiling. On the other hand, if a similar piece is free of strain, it is difficult to obtain distortion on boiling.

10. STOKES MODEL 741 PRESS

The 50-ton, self-contained, fully-automatic molding press is known as the Stokes Model 741, and was developed primarily for broadening the increasingly important field of fully-automatic compression molding. Specifically, it is now possible to run automatically large multi-cavity molds within the available capacity of 50 tons. Such molds are conventional in design as regards the arrangement of the heating plates, K.O. system, feeding, etc., so that much of the so-called specialized knowledge heretofore required for automatic compression presses is no longer necessary.

Stokes Model 294 Heavy Duty Preform Press

Model 294 heavy-duty preform press was developed to meet a need in the plastics field for larger and denser preforms than heretofore possible with existing machines. Significant is the fact that this No. 294 press will make preforms 4" diameter with 2-5/8" loose fill in the die cell, and both top and bottom edges will be equally hard. The density of the top and bottom faces is actually greater than in the middle of the preform.

A 200 ton model of the above press is contemplated for 1950 that will produce large preforms at the rate of 20 to 30 per minute.

11. BALDWIN MODEL 30 PREFORM PRESS

The model No. 30 preform press was developed to satisfy a demand for preforming extremely fine powders which heretofore have not been successfully preformed.

The significance of this development is that powders can be pre-formed without the usual process of granulation. This means that the purchaser of such a machine can buy plastic powders at a lower price than those who require the material to be granulated.

A new development for 1950 will permit the pre-forming of bulk materials, that is, materials having a bulk factor as high as 15 to 1.

The #116 Nash Rotary Edger

12. ALDRICH 5 STROKE DIRECT FLOW PUMP

The Aldrich 5" Stroke Direct Flow Pump series was developed to extend to users of pump equipment a line of high pressure, reciprocating pumps that could be standardized so as to eliminate the expense of a number of different maintenance parts.

The Series includes Triplex, Quintuplex, Septuplex and Nonuplex units, with 3, 5, 7, and 9 cylinders respectively. This series ranges from 100 hp to 275 hp. Except for main bearings, all wearing parts within each series are interchangeable, i.e., only three sets of maintenance parts are necessary to cover the total range of all three pump series from 100 to 2450 hp.

13. HEDWIN IMPULSE HEAT SEALER

Without requiring buffers, or slip sheets, the Hedwin sealer bonds many types of plastic film and sheeting. Representative of those successfully bonded to date are: vinyl chloride, vinyl chloride acetate, polyethylene, Saran, Pliofilm, cellulose acetate, Cellophane, ethyl cellulose and coated papers. The process may be applied to seal effectively ANY LENGTH or CONTOUR of seam.

Initial plans for completing a production prototype of a very simple hand fed machine are currently underway. This machine will seal any gauge of material up to a total thickness of .020" with a maximum seam length of approximately 12". Extensive tests and trial runs on this set-up have proved that it is capable of a complete sealing cycle of from ½ to 3 seconds, including cooling time, and depending upon thickness of material.

14. THE "PONY LABEL DRI" LABELING MACHINE

The Pony Label DRI is a machine which applies plastic coated labels to various kinds of objects and does a neat, clean, fast, labeling job because it eliminates the glue that is ordinarily necessary in the common type of labeling machine. The plastic is a better bonding agent than the common variety of water soluble adhesives and, therefore, it is able to label such objects as those made of plastic, tin, and other hard-to-stick-to surfaces.

The elimination of the glue and the glue mechanism permits a top speed of over 350 per minute, compared to other units which are capable of 150 per minute. The elimination of mechanism by the use of pre-coated plastic labels has led to a simpler piece of machinery, one which needs no change parts for going from one size work to another and, therefore, a more flexible piece of machinery for shorter runs and varying production requirements.

15. No. 116 NASH ROTARY EDGER

The No. 116 Nash Rotary Edger was developed for the edging of plastic dinnerware but at the same time is capable of edging any flat circular moldings. When the tooling on this machine is changed radically, the No. 116 Nash Rotary Edger is capable of trimming and edging to shape vinylite phonograph records.

The mechanical method of edging plastic dinnerware will produce more uniform results as flash removal is confined to a minimum line and the edge is buffed back into a polished finish.

16. WHEELABRATOR TUMBLAST FINISHING MACHINE

The wheelabrator tumblast machine using crushed apricot pits as the blasting medium, has been introduced for the removal of flash from thermosetting molded parts. Typical production performance at Minneapolis Hon-

eywell Heat Regulator Co. is reported as follows:

A 2 cu. ft. load of plastic parts, averaging 800 pieces, is Wheelabrated for from 12 to 20 minutes depending upon the flash condition. It has not been necessary to blast any longer for any piece produced—all flash being removed within this time. Flash is completely removed from metal inserts by this process. Finishing costs were reduced $100,000 during the first year with this machine.

17. TURBO DRYER FOR PLASTICS EXTRUDERS

The TURBO Dryer was introduced to the plastics industry to fill the need for a continuous automatic dryer to supply the extruders with thoroughly and uniformly dried material. Special features, such as spun tray shelves, removable wipers and levelers, and hinged panels to make interior of dryer accessible from all sides were incorporated to facilitate cleaning.

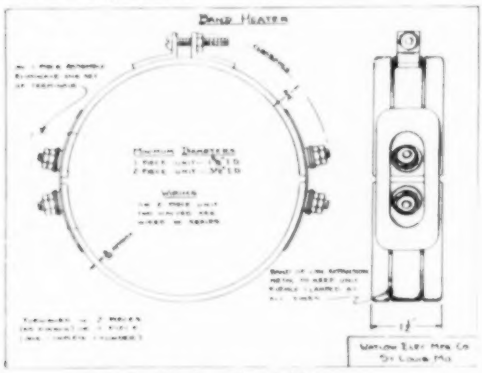
To prevent regain of moisture by the dried material and the loss of heat the TURBO Dryer is preferably mounted above and next to the extruder so that the hot dried product is delivered directly to the feed hopper of the extruder. A substantial gain in the output of the extruder is reported by users as a result of feeding heated material continuously to the hopper. The TURBO Dryer comes equipped with variable speed drives so that its output can be synchronized with that of the extruder.

The high uniformity of the dried product is achieved by the automatic, periodic transfer, mixing and spreading of the material during drying. This operation exposes fresh undried surfaces to the drying air and shortens the drying time.

18. WATLOW BAND HEATER ASSEMBLY

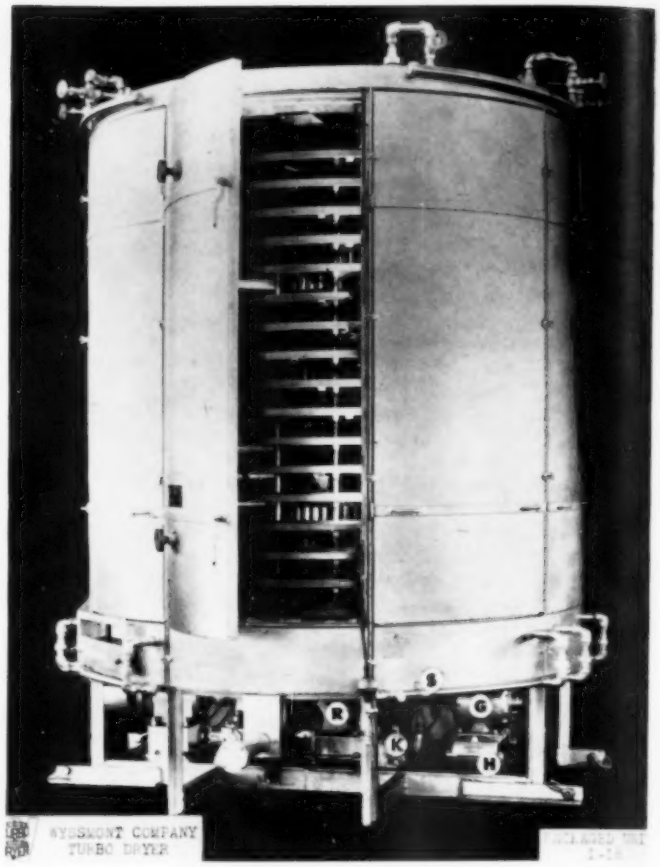
The clamping band is made of a metal with very low expansion qualities, thus assuring good contact between the heating unit and the cylinder to be heated, at all temperatures. The band is notched so that the terminals do not interfere with the clamping.

This narrow banded unit with the terminal jumper arrangement makes a much better all over contact with the cylinder and the clamping band asserts direct pressure over the entire width of the nichrome wire resistor, thus assuring the maximum efficiency of heat conductivity. With this extremely high heat conductivity quality, the unit is capable of being rated with a much higher watts density than has before been possible.



The Watlow Band Heater

This unit makes it possible to mold plastics with higher melting points and also makes it possible to speed up the molding cycle, thus increasing production.



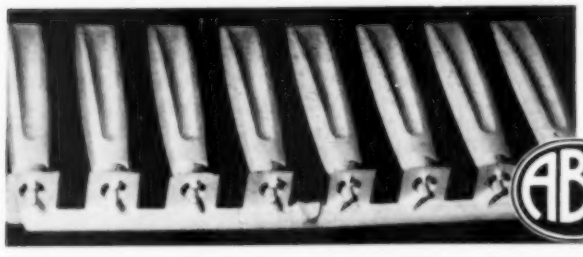
The Wyssmont Turbo-Dryer

The safe watts density for units in order to give good service and long life, has been 25 watts per square inch or lower. With this new type unit the watts density can be 35 to 40 watts per square inch and probably higher, although actual field tests have not as yet been run on units over 40 watts per square inch.

19. FLUID HEATING AND HIGH TEMPERATURE CALENDARS AND PRESSES

Increased production speeds and closer quality control have created a different problem of maintaining uniform surface temperatures on calendar rolls and presses. Peak demands on the boiler and frictional heat limit the speed of operation with steam and the uniformity of the resulting product. Automatic operation with steam is practically impossible.

The Hydrotherm Fluid Heating System, developed originally in Europe and perfected through numerous installations, provides uniform temperatures for either heating or cooling over a very wide range. Fluids are available for any temperature from minus 20°F. to plus 700°F. The use of a fluid system permits heating or controlled high-temperature cooling, or alternate heating and cooling with a short cycle of operation, with one heat carrier. Installation can be made completely automatic with great economy in labor costs. Shock loads on the boiler, always prevalent with steam operation, are eliminated entirely by fluid heating and cooling; maintenance is also greatly reduced.



Intricate Molds? The mold for the brush handles shown at the left *(courtesy Fuller Brush Company)* required not only intricate design, but ultra-smooth finish to meet today's mass production needs. Our sound engineering experience and modern equipment and methods are the answer. *WRITE FOR LITERATURE.*

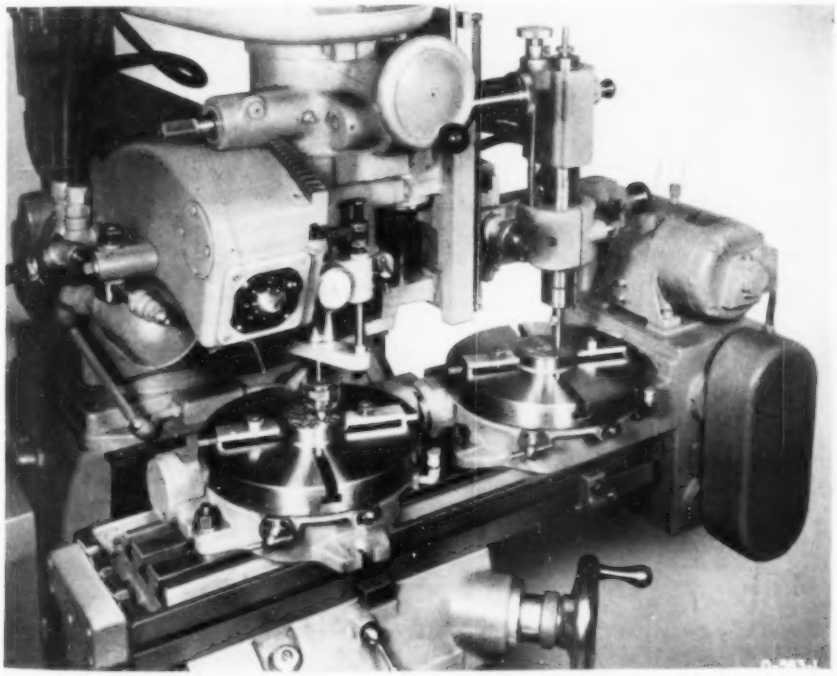
PLASTIC MOLD DIES • INJECTION • COMPRESSION • TRANSFER • HOBS and HOBBING • DIE CASTING DIES • ENGINEERING and DESIGN SERVICE

ABA **A.B.A. TOOL & DIE CO. INC.** MANCHESTER, CONN. Phone: Man. 8552-Cable: ABA

20. CINCINNATI TOOL AND DIE MILLING MACHINE

A rotary method of die-sinking whereby dies and molds of certain types can be accurately reproduced from a master is done on die sinking machines equipped with a sensitive tracing mechanism and some means of slowly rotating the work piece and master under the cutter and tracer finger respectively.

The new Duplex Rotary Table Attachment is a self-contained unit consisting of duplex rotary tables driven in unison by a fractional horsepower motor which also provides a slow but continuous crossfeed to the saddle. In effect, this converts the machine into an automatic duplicator since, once a cut is started, no attention is required, except for a periodic inspection, until it is time to start another cut. Eight speeds for the rotary tables and eight cross feed rates are provided and, in addition, the tables can be rotated by hand for set-up purposes.



Synco Cuts Price

Of interest to manufacturers of decorative laminates, is the recent announcement by the Snyder Chemical Corporation, Bethel, Connecticut, of price reductions on SYNCO phenolic resins 135 and 418 resulting from increased production of these materials. The reduction of SYNCO 135 (low-pressure varnish for corestocks) amounts to an average of 5½c per pound. On the SYNCO 418 (colorless grade for treating decorative papers and transparent overlays) the price reduction amounts to an average of 2¾c per pound. These two materials are used in conjunction for manufacture of light-gauge, all-phenolic decorative laminates which are finding increasing markets in view of their low-cost, improved flexibility and ease-of-fabrication.

ST. LOUIS AND NEWARK OFFICERS

The following officers were elected by the St. Louis Section:

President: C. F. Mangin, c/o Cinch Manufacturing Co., 2625 Locust St., St. Louis 3, Mo.; Vice-President: Karl Kopplin, President, Kopplin Moulding Corporation, 1440 Blair Ave., St. Louis 6, Mo.; Secretary: A. G. Werner, 3650 Dover Place, St. Louis 16, Mo.

The following three were elected members of the Board to serve through 1952: G. F. Mangin, C. Todd Clark and A. J. Koller.

The results of the Newark Section election and directors meetings were as follows:

President: Russell B. Akin, 24 Vera Place, Montclair, N. J., Montclair 3-0098J; Vice-President: Edward B. Soules, Detroit Mold Engineering Co., 1217 Central Ave., Hillside, N. J., Elizabeth 3-5840; Secretary-Treasurer: Edward W. Rowan, 129 Mountain Ave., Summit, N. J., Summit 6-6644R; Board of Directors: Russell B. Akin, 24 Vera Place, Montclair, N. J., Montclair 3-0098J; Edward B. Soules, Detroit Mold Engineering Co., 1217 Central Ave., Hillside, N. J., Elizabeth 3-5480; Gilbert L. Peakes, 276 Grove Ave., Metuchen, N. J., Metuchen 6-0998; Eugene L. Fortney, 187 Mountainview Ave., Nutley, N.J.; Roland Frackenpohl, 100 Hillside Terrace, Irvington N. J., Essex 5-7713; Peter W. Simmons, 66 Hampton Court, Maywood, N. J.; Edward W. Rowan, 129 Mountain Ave., Summit, N. J., Summit 6-6644R; William J. Waters, 182 Summit Road, Elizabeth 3, N. J., Elizabeth 3-6933; Albert A. Kaufman, 38 Rockview Ave., North Plainfield, N. J., Plainfield 5-1401; Harold E. Frutchey, 145 Bryant Ave., Springfield, N. J., Millburn 6-4216J.

WESTN. NEW ENGLAND ELECTS

Results of the Western New England Section Election and Directors' Meeting is as follows:

National Director: Sherwood Young, Church Mfg. Co.; Section Directors: James Dunn, Church Mfg., Co., Emil Marciniak, A. G. Spalding Co., John Mallory, Parker Stamp Works, Sherwood Young, Church Mfg. Co., George Whitehead, Improved Paper Mach. Corp., Ed Vaill, Bakelite Div., M. Nickerson, DeBell & Richardson, R. Crawford, Monsanto Chemical Co., H. Hasenzahl, American Optical Co.; Section Officers for 1950: President, Ed Vaill, Vice-President, H. Hasenzahl, Secretary, R. Crawford, Treasurer, M. Nickerson; Section Committee Chairmen for 1950: Membership Committee, G. Whitehead, Credentials Committee, E. Marciniak, Nominating Committee, S. Young, Program Committee, M. Nickerson, House Committe, J. Dunn, Publicity Committee. W. Larson.

Professional ACTIVITIES
—COMMITTEE REPORTS

PIN-POINT GATING

RONALD G. DAVIS, Chairman

"Pin-Point" gating is the latest, and perhaps the most controversial development in the injection molding field. Many aspects of this new approach are exactly opposite to what has been the common practice, and so has given rise to a great deal of disbelief and skepticism on the part of many molders. However, "pin-point" gating is being used successfully on enough molding jobs in plants throughout the country to prove that it is not a passing fad but will eventually form a nucleus for all gating. We understand such gating is used quite extensively throughout the west.

This type of gating is referred to as "pin-point" gating because of the relatively small orifice through which the plastic enters the cavities of an injection mold. Some claims made for this type of gating sound fantastic and unbelieveable, however, some of the claims demonstrated are found to be truly amazing. Pieces which show weld lines, mica smears and other "cold marks" when molded with conventional gates are free from such defects when gated with the so-called "pin-point" method. Strength characteristics seem also to be improved considerably. An example is the experimental phonograph record produced by Mr. J. Wilson of Best Way Products. Mr. Wilson recently demonstrated the strength of the "pin-point" gated record as compared with the conventionally gated one by slamming the record with considerable force, over the edge of a desk. Such treatment would shatter the conventionally gated record at the first blow. The "pin-point" gated record withstood repeated blows. Upon striking the "pin-point" gated record against the corner of the desk it also could be shattered on the first blow. This, of course, was a very crude test, nevertheless, it was effective as a way of demonstrating the comparative impact qualities of the records molded with and without "pin-point" gating.

It has also been reported that "pin-point" gating has improved the strength of refrigerator breaker strips to quite an extent. It is quite easy to shatter and break conventionally gated strip by bending and twisting. Whereas, according to reports, it is almost impossible to break or shatter the "pin-point" gated strip in the same manner.

M. R. Gerow

One of the greatest advantages claimed for "pin-point" gating is the possibility of using molds with up to twice the projected area as rated by the injection manufacturers. Maintaining a very accurate balance between injection pressure and the time of "freeze" at the gate will accomplish the same thing regardless of the type of gating employed. However, with "pin-point" gating the cross sectional area at the gate is so small that the "freeze-up" time is reduced to a minimum, thereby simplifying the maintenance of such a balance. In the case of a sprue gated piece when the cycle is sometimes determined by the diameter of the sprue the change over to "pin-point" gating has resulted in shorter overall cycles due to elimination of pistondwell in the injection cycle. Finishing costs are eliminated which is an obvious advantage.

Theory

Mr. Miller of the Bloomfield Research Division has made a study of above mentioned factor. According to their findings and calculations, the temperature rise on polystyrene amounts to 8.7 F. per 1000 P.S.I. of pressure drop. This temperature rise takes place regardless of the type of gating used. However, it is believed there may be a difference in time and location at which a pressure drop takes place in an injection cylinder

---

The year 1949 was a very active year for the National Professional Activities Committee, and we are attaching reports from some of our various committees as follows:

Annual Report of Subcommittee on Automotive—
by John K. Totten

Annual Report of Subcommittee on Household Appliances—
by F. A. Martin

Annual Report of Subcommittee on Pin-Point Gating—
by Ronald G. Davis

Annual Report of Subcommittee on Plastic Film—
by M. R. Gerow

Annual Report of Subcommittee on Quality Control—
by Jerome Formo

It is, of course, one of the prime functions of this national committee and its subcommittees to be a guide or consultant to those people who are unable to find the technical or manufacturing data they require. During the year of 1949 we have had several requests, both from this country and abroad, to assist people in locating men and data for the construction of plastic plants or for technical data and knowledge to assist them in the improvement of their plastic products.

Probably one of the outstanding jobs this committee has worked on during the year, has been the initiation of a program as reported by the Professional Activities Committee on plastic film, which is an attempt at standardizing test procedures for vinyl film to be used in articles that will come in contact with furniture finishes.

We respectively submit this report for your consideration, and a copy of this report will be sent to each section of the Society of Plastics Engineers, as well as copy to each of the national officers. Additional copies can be obtained by individuals who are interested through the Professional Activities Committee.

Respectively submitted,
M. R. Gerow
National Chairman

depending on the size of the gate used.

With conventional and comparatively large gates, we assume such pressure drop to be gradual from rear to front of the cylinder or, if the gates are very large, the pressure drop may take place nearer to the rear of the heating cylinder. This can be determined to a certain degree by observing the piston pressure gauge of a machine during the injection cycle. Therefore, if we go along with the assumption any temperature rise due to pressure drop in the cylinder would take place gradually through the cylinder or close to the rear. A temperature rise gained through a pressure drop such as this would in all probability be lost or minimized before the material reached the gate of the mold, due to conductive losses. With "pin-point" gating, we believe the pressure drop through a cylinder takes place very close to the nozzle or gate of the mold. Therefore, the possibility of losses through conduction are greatly minimized. All of which means, if the assumptions are true, that the material flowing into a mold cavity through a "pin-point" gate is heated, momentarily, considerably beyond the normal molding temperatures generally used.

The additional momentary heating of the polystyrene, it is believed, is responsible for ease in filling large area pieces and for the absence of cold marks in the form of flow lines, poor welding, mica smears, and the like.

In "pin-point" gating the maximum amount of energy is permitted to be put into material by the injection system of a machine. In contrast to this, when using large gates, it is a very rare occasion when one finds the hydraulic pressure on the injection piston to be up to set pressure during the filling of a mold.

The above mentioned condition is the same as it used in plunger molding of thermo-setting materials where gate size is regulated to give maximum pressure on the materials with minimum fill time.

Mr. H. G. Schaeffer of Wolverine Plastics, Inc., had occasion to actually observe the molding of a very large refrigerator crisper pan. The piece was sprue grated from the center of the pan. The original dimensions of the sprue were approximately ¾" at the gate end and ½" at the small or contact nozzle end. The customer was using Dow 666 material at the time and while the pieces filled there was trouble with poor welding and mica smears. Upon switching to BMS6-AL it was found that in addition to the above mentioned defects the pieces would no longer fill properly. Usually the first suggestion for overcoming such a trouble would be open up the gates. However, in this case the large sprue bushing was removed and replaced by one with orifice dimension of 5/16" at the gate end and ⅛" at the nozzle contact end. At the same time a special nozzle was installed with an outlet of .100". This of course is not "pin-point" gating. However, as can readily be seen, it is a departure from anything a molder would have tried in the past. Pieces molded with this smaller sprue and nozzle set up were free from all forms of cold marks and the customer was no longer plagued by short shots from the BMS6-AL Polystyrene.

In the conventional type of gating on multiple cavity molds, the usual procedure is to machine the runners and branches in only one half of the die, usually the movable half; they are either trapezoidal or half round, the idea being to provide a runner with the least amount of resistance to flow. The runners and branches are carried within approximately ¼" of the cavities and then tapered down to whatever thickness of gate is required; the gates generally are continued in the same width as the runners or branches. Usual practice was and still is to machine the gates as thin as possibly .202" and then, if trouble was experienced in filling the cavities the gates would be opened up until all cavities filled.

Through our discussions with molders who have had experiences with the "pin-point" type of gates, we have come to the conclusion that the conventional runner, branch and gate construction as described is responsible for many current troubles being experienced in molding polystyrene.

After giving considerable thought to the problem of polystyrene flow in the runners and gates of injection molds we have come to the conclusion that rather than having provided for an easy flow of material into the mold cavity, we have actually partially blocked it where the runner or branch tapers into the gate. This behavior is explained thus: most or all of the flows of polystyrene through runners and gates takes place in the center of the runners or branches. The outside surfaces of the polystyrene which come in contact with the steel surfaces of the mold runners and branches are much cooler than center portions and very little, if any flow takes place along these outside surfaces. Therefore, we believe it is safe to assume that a blocking action takes place at the point where the material is supposed to flow into the mold cavity. The outside cool skin surfaces converge at the tapered gate section of the runners or branches and we suppose have a tendency to hold back flow of hot center material. This corking action evidently is not complete, otherwise, no mold cavity would even fill. Such material entering the die cavity could, in all probability, be responsible for poor welding, mica smears and in severe cases, short shots. In "pin-point" gating these problems, according to molders, are almost entirely eliminated.

Multiple cavity molds constructed with "pin-point" gating are sometimes three plate construction; the usual cavity and core or force plate plus a floating runner and sprueplate. The runners are usually round and machined so that half the runner is in the runner sprue plate and half in the usual stationary core force plate of the mold. The runners or branches are brought to full size up to within .040" of the mold cavity and choked down to .030"-.020" diameter **without taper.** This small gate orifice is located at the center of the runner or branch so that only the hot center material can flow through it into the mold cavity. The cooler skin portions are stopped at the point where the runner is choked down and cannot enter the small gate orifice.

The exclusion of the above mentioned cold material from the polystyrene flow into the mold cavities is probably responsible in large measure for the absence of cold marks, flow lines, poor welding and mica glaze or smear. We also think another factor enters the picture. This is the temperature rise which takes place in the polystyrene due to the mechanical energy expanded in forcing the material through the heating cylinder of an injection machine.

We do not feel that "pin-point" gating is the answer to all molding problems which may arise. We do feel that it has its place in the injection molding industry. It has certainly served to give the experts something to think about.

Specifications

Mr. J. M. Wilson, Watson-Stillman Company

Before our introduction to the pinpoint gating method, it seemed to be common belief that runners design was not of any great importance other than to get the material from the sprue opening to a point near the cavity. The runner, as a rule, was of angular design, cut on one side of the die and tapered to the gate entry. The cooling effect of the mold surfaces reduces effective flow of the material to a point that completely corks the gate. This could only be remedied by increasing the gate opening to reach the hot section of the runner. Such practice, of course, produced a molding, but presented a problem in the removal of the gate, which added considerable cost in the finishing of the item molded and usually required the full pressure of the injection ram to fill the cavity.

Basically, the idea of injection mold design is to transfer hot plastic material from the injection cylinder, thru a nozzle in contact with a sprue bushing to runners and gates to the mold cavity. The important factor is that material in this tour should be restricted as little as possible, and arrive at the gate in a flowing state.

To accomplish this, we should start at the nozzle end with the nozzle opening back tapered so that any chilling effect from its contact with the mold, commonly referred to as a cold slug, will be drawn from the nozzle after each cycle, leaving only hot plastic material within the heated section of the nozzle. With this design of nozzle, large sprues are unnecessary.

The preferred shape for runners is round—cut half in each side of the die—and they should be highly polished in the direction of the flow of material. The cross sectional area of the runners will vary with the weight of the shot and the experience of the molder. It seems likely that it will be possible at some future date that this gating will be reduced to an exact science and it will be possible to calculate the correct runner diameter.

With the round design and ball radius at the gate entrance, the material has free flow through the effective section of the runner. It is with recommendations that a runner be cut as close to the cavity wall as is practically possible, to reduce the gate size to a minimum and would suggest, a dimension of .030" to .040".

The gate shape can either be of round design (or flat), with a minimum area to properly fill the cavity in its allotted time. Recommendations are to cut the gate opening with no greater area than .0008 square inch regardless of the parts weight or area, and if found not sufficient, to increase it by carefully grinding to a uniform larger area. Never resort to hand grinding in the machine, regardless of time consumed in set-up time. If, by increasing the gate 50% the cavity is still not properly filled, it would then necessitate the increase of the area of the runner at its point of entry to the gate section, this in most cases will result in successful design.

In prevailing dies with runners and gates, the change to pin-point gating can be readily made. Recut the runner on one side of the die and match for a slight distance on the other side with the same design and depth of runner, just prior to the gate entrance.

With this method of molding, you will find a marked improvement in the finish of the part, reduction in pressure, and a very considerable saving in the finishing operation of a molded part.

This method has been particularly successful in the molding of styrene. Going hand in hand with pin-point gating is the proper coring and heating of the mold. It has been suggested that a heat be used of 140 degrees F. and 150 degrees F. circulated by an individual heater using either water or oil.

With this combination in molding methods, you can not only improve impact strength of the part molded, but greatly improve cycle time.

Methods in Practice

Pin-point gating theory suggested the size of the gate maximum, to be .0008, in practice, it has been proven the size of the gate should be from 0.0002 to 0.001 square inch in area, depending upon the size of the molding, number of cavities, and type of material. (Styrene smallest; acetate next larger; methylmethacrylate largest.) If the gate size/wall thickness ratio is less than 1 to 2, there is the danger of the gate pulling a hole in the part. To produce the cleanest molding, a taper of 30 degrees should be cut into the gate. This will allow the gate to break even with the casting. In multiple cavity molds these gates should be within 10% of each other in size.

The art of pin-point gating was materially advanced by including the principles of restriction of material flow in the mold design. Ideally, the material should reach each cavity at the same instant. To assure that this will happen, the runners are reduced in size as the cavities are approached. A gate runner 3/16" in diameter, 7/32" lateral runners join the ¼" sprue runner. With these restrictions in size, the material is retarded at each turn of the runner and reaches all cavities simultaneously. The runners need only be smooth enough to assure an easy removal of the plastic. The size of the gate runner should be 5 to 10 times the gate size, depending upon the size and shape of molded piece.

Where there is greater variation in size and shape of parts in one mold, it is found necessary to restrict the gate size of the smaller parts to control the density of the moldings. This will assist in keeping the shrinkage rates the same in all size castings.

A recently developed design feature is termed "deflected gating." The thin hair of material passing through the small gate into a large cavity tends to cool beyond the point of good welding by the time the cavity is filled. By deflecting the stream against a wall instead of directing it out into the cavity, the material immediately builds up a mass in which the two insulating walls and the basic flow pattern is set up. This is especially valuable in heavy, transparent moldings, where weld lines are objectionable.

QUALITY CONTROL—

JEROME FORMO, Chairman

Two meetings of the Quality Control Committee were held in 1949. The first on May 27, 1949, was an organization meeting at which time four members discussed the possibilities of an active organization. At this first meeting the decision was made to collect reports on the use of quality control in the plastics industry and to present these reports at the second meeting. It was considered necessary to publicize the work of the committee in the form of published articles and other notices in the press to create interest in the use of quality control. After this interest is created and quality control is put to work, more information can be gathered and used for the ultimate purposes of the committee. After considerable discussion, it was finally decided that the ultimate goal of the committee would be to establish working standards which can be used in the plastics molding industry for the purpose of regulating standards of quality in such characteristics as dimensions, surface finishes physical and electrical strength, color, etc. Finally it was the hope of the committee that a quality control manual might be published in such form as to make it possible for shop foremen to put quality control practices into effect in their plants. A bibliography of 259 references was presented at this meeting showing only two references to the use of quality control in the plastics industry. This fact served to emphasize the need for proper education in the use of this production tool in our industry.

The second meeting was held on October 12, 1949, and there were eight members in attendance. At this time reports were presented by several of the members on the use of quality control in their plants. An outline for work was presented to the committee and assignments were made to the various members for specific work in fields in which these individuals are interested. This far everyone who had been contacted has been very agreeable to the program of the committee, and in most instances, active cooperation has been secured.

Members at present on the committee represent custom injection molders, custom compression molders, proprietary compression and transfer molders and plastics coating manufacturers. Close cooperation with the A. S. T. M. Committee on Quality Control has been assured by the chairman of that committee, as well as by the American Society for Quality Control.

Publicity has included printing of the complete report of the first meeting in the SPE JOURNAL and the release of the report of the second meeting to about 300 technical society publications and house organs. Interest in the work of the committee has been manifested by requests from several companies and individuals who wish to be included on the mailing list of reports.

It is regrettable that the Western Electric Company cannot take part in the work of the committee at the present time even though this company has had great experience in this particular work. The membership at the present time consists of:

W. P. Gobeille, Nash-Kelvinator Company
Louis W. Walter, General Amer. Transportation Corp.
Marion Arthur, Humble Oil and Refining Company
Dale Amos and Fred Tulley, Amos Molded Products
Charles A. Bicking, Hercules Powder Company
F. W. Warner and F. E. Satterthwaite, General Electric
Jerome Formo, Minneapolis, Honeywell Reg. Company
Dr. John Brown, formerly of Prolon Plastics was forced to resign because of a change in position.

Others who are interested and at present are on the mailing list are:

J. Manuele, Westinghouse Electric Company
Lloyd Anderson, Chicago Molded Products Corp.
Earl Keown, Santay Corp.
A. G. Dalton, Western Electric Company
H. F. Dodge, Bell Telephone Laboratories
E. W. Birney, Consolidated Molded Products
J. H. Field, Jr., La Consolidada S. A.
W. C. Graves, Western Electric Company
Arthur L. Krebs, Pyro Plastics Corp.
W. M. Schreck, General Electric
D. M. Yost, The Sorg Paper Company.

Present assignments include, "Quality Control by Multiple Correlation in the Injection Molding Shop," Dale Amos and Fred Tulley; "Quality Control Problems Peculiar to Large Moldings," Louis Walter; "Quality Control Problems in Protective Coatings," Marion Arthur; "Quality Control Problems in Injection Moldings," Wm. Gobeille; "Quality Control for Precision Molding," Jerome Formo.

It is highly desirable that the membership of this committee be expanded to at least twenty-five members in order that more attention may be paid to individual problems.

In response to a questionnaire sent to the members, it seems preferable to continue with the present plan of two meetings per year.

This committee has had time only to get into the problem of quality control far enough to know that a great deal of work should be done. It is the hope of each member that cooperation from all the plastics industry will be forthcoming and that the data necessary for setting up various standards may be made available to the committee.

It has been recommended that the present committee be continued and expanded for the next year.

Respectfully submitted,
Jerome Formo, Chairman

AUTOMOTIVE—

JOHN K. TOTTEN, Chairman

Introduction to—Performance Specification—Plastic Steering Wheels

The materials used for plastic steering wheels should be low in soluble matter loss, under 1%, and have a minimum elongation in tensile of 50%. Desirable properties of the material would include a wide color range, good color stability, and a resistance to attack by human perspiration.

Performance Specification—Plastic Steering Wheels:

Scope: This specification covers plastic steering wheels molded by injection or compression methods or a combination of the two suitable for automotive use.

Parts Test Specification.

Materials from which the wheels are molded shall meet the following requirements, as well as the physical properties specified under the respective material specifications.

I. Deflection Test.
Steering wheels shall withstand a stress of 150# minimum transverse loading at —10°F. after conditioning for 16 hours at —10°F.

II. Hot & Cold Test.
Wheels shall be unchanged after exposure to the Hot & Cold Test. (Total exposure: 48 hours at —20°F. to —40°F.; 48 hours at 150°F. to 160°F.)
There shall be no cracking or breakage at any point.

III. Impact Test.
Steering wheels shall withstand an impact force of 800 foot-pounds at room temperature. (77°F., plus or minus 2°F. and 50%, plus or minus 2% R.H.)
The covering of the wheel must not shatter or fly off, although it may crack. The metal insert must not fail at any point on the rim or hub.

IV. Accelerated Aging Test.
Total exposure:
48 hours at 100°F., plus or minus 2°F., 100% R.H.
48 hours at —20°F. to —40°F.
48 hours at 150°F. to 160°F.
48 hours of ultra-violet
The covering of the wheel shall not crack, loosen from the metal insert, discolor, check, or show any change beyond that permitted as indicated by the master sample.

Parts Test Specification—Test Methods.

The following test methods shall be used for the requirements listed in the preceding section.

I. Deflection Test.
A. Wheel shall be mounted at hub on a spindle and fastened down securely.
B. Load shall be applied at a rate of 2¼ inches per minute.
C. The force applied shall be perpendicular to the plane of the wheel.
D. The surface of the force touching the wheel shall be 3 square inches, preferably 1" x 3".
E. The load on the wheels shall be applied at points on the respective wheels indicated below:
1. On 2 spoke wheels

Since 1939 — VIBRA-VEYOR

Now we offer in addition for drying and preheating plastic powder for injection, extrusion and compression

FOUR NEW MODELS:

1 TUMBLE-VEYOR — For 2 and 4 oz. 10 lbs. per hour
2 HOT-AIR-VEYOR — For 8 oz. 30 lbs. per hour
3 SPIRA-VEYOR — For 16 oz. or over 500 lbs. per hour
4 ROTO-VEYOR — For compression preforms

Manufactured by

THE MISKELLA Infra-Red COMPANY
MAIN OFFICE 7302 GRAND AVE., CLEVELAND 4, OHIO

a. 5° off junction of the spoke and rim.

2. On 3 spoke wheels
   a. Midpoint on the rim between any 2 spokes where angles subtended by spokes are equal.
3. On 4 spoke wheels
   a. Midpoint on the rim between any 2 spokes.

II. Hot & Cold Test.
1. 6 cycles in sequence
2. Cycle phases in sequence
   a. Sub-zero phase—8 hours
      (1) —20°F. to —40°F.
   b. Dry Heat phase—8 hours
      (1) 150°F. to 160°F.

Parts to be submitted to each phase of the cycle in the sequence listed.

III. Impact Test.

The steering wheel shall be mounted on a spindle in the following manner: The spindle shall form a 45° angle relative to the floor. The lower edge of the steering wheel shall be 12 inches from the floor, this being measured as a perpendicular distance to the floor. The force is exerted by a sand bag weighing 175# suspended by a freely swinging wire cable. The bag's center of mass shall be 12 inches from the floor and 94 inches, plus or minus 2 inches from the supporting cable.

The bag shall have the following approximate dimensions to govern a standardized shape: 10 inches in diameter and 24 inches long, irrespective of mounting bridle.

The bag shall be elevated at an angle of 65° from the point of impact and released quickly to obtain a freely swinging impact force of 800 foot-pounds.

IV. Accelerated Aging Test.
1. 6 cycles required.
2. Cycle phases in sequence.
   a. Humidity phase—8 hours.
      (1) 100% Relative Humidity
      (2) 100°F., plus or minus 5°F.
   b. Sub-zero phase—8 hours.
      (1) —20°F. to —40°F.
   c. Dry Heat phase—8 hours circulating oven
      (1) 150°F. to 160°F.
   d. Ultra - Violet phase — 8 hours.
      (1) ASTM D620, S-1 Sun Lamp

Wheels to be submitted to each phase of the cycle in the sequence listed above.

Introduction to Performance Specification—Molded Plastics Ignition Parts.

The specification is not intended to be exhaustive but merely to indicate basic requirements. Climatic conditions prevailing in various parts of the world may necessitate more stringent requirements than are outlined here such as higher dielectric strength, low-loss properties, and arc resistance, to insure successful ignition system operation. Materials with adequate arc resistance properties and higher dielectric properties may be used in tropical regions, whereas low-loss properties and higher heat resistance may be required for desert regions. Close proximity of terminal posts, hi-tension cups, and electrodes may necessitate higher RMS voltages for the dielectric fatigue test.

Performance Specification—Molded Plastics Ignition Parts.

Scope: This specification covers molded plastic parts used for ignition system applications such as: coil cases, covers, distributor caps, distributor terminal housings, rotors, spark plug covers, etc.

Material Specifications:

The materials from which the parts are molded shall have the following physical properties. The materials used shall meet the minimum values and not exceed the maximum values.

1. Tensile Strength	5,000
2. Flexural Strength	8,000
3. Dielectric Strength, short time	300
4. Dielectric Fatigue Test	60'
5. Heat Distortion	265
6. Impact Strength (Izod notched), ft.-lbs./inch notch minimum	0.30
7. Water Absorption 24 hour immersion, maximum	0.50%

Test Procedures:

The physical properties listed above shall be determined by the following test methods:

1. Tensile Strength	ASTM D651-48
2. Flexural Strength	ASTM D790-45T
3. Dielectric Strength	ASTM D149-44
4. Dielectric Fatigue Test—See Part Test Requirements	
	Test Methods
5. Heat Distortion	ASTM D648-45T
6. Impact Strength	ASTM D256-47T
7. Water Absorption	ASTM D570-42

General Requirements:
1. Parts shall compare favorably with the master samples.
2. Molded parts shall be free from blemishes such as orange peel, weld marks, pock marks, and other undesirable surface conditions.
3. Parts shall be completely cured and free from porous areas and evidences of pre-cure.
4. Molded parts shall be furnished the purchaser and approved before production quantities can be released.
5. Each part shall be of such size and shape as specified on the part drawing.
6. All parts shall be finished off smoothly; flash, gates, etc.
7. Parts shall be free of chips, dust, and other metallic contaminants that will impair the necessary dielectric qualities.
8. Molded parts shall be free of cracks and show good adhesion around the molded-in inserts.

Parts Test Specifications:

I. All parts to be tested shall be attached in the normal manner to the assembly of which they are a component. This assembly shall be the unit to be subjected to listed performance tests.

II. The parts covered by this specification shall meet the following performance requirements.
1. Hot & Cold Test.
2. Dielectric Fatigue Test.

As a result of the Hot & Cold Test and Dielectric Fatigue Test, parts shall not:
1. Warp or sustain a dimensional change outside the specified tolerances.
2. Check or crack.
3. Break - down electrically before the 1 hour endurance period has elapsed.

Test Procedures:

I. Hot & Cold Test
   a. 6 cycles required
   b. Cycle phases
      1. Sub-zero phase—8 hours At —20°F. to —40°F.
      2. Dry Heat phase—8 hours circulating oven At 180°F. to 190° F.

Subjection of parts to the Hot & Cold Test shall begin with the sub-zero phase and alternate with the dry heat phase with shortest possible lapses between phases. When the part has passed through 6 exposures each phase, the test is completed. Observations shall be taken at the end of each phase for cracking or warpage that may have developed as a result of the exposure.

II. Dielectric Fatigue Test
   A. Testing material from which the parts are to be molded.
      1. Test specimen.
         a. A disc, 4" - 6" in diameter, 0.125", plus or minus 0.005" thick, molded in a full positive mold.
         b. Bake disc 30' at 180°F., plus or minus 2°F. in a dry circulating oven.
         c. Immediately following the baking period, subject the disc to 12,000 volts, RMS, 60 cycle at an ambient temperature of 180°F., plus or minus 2°F. for one

hour or failure which ever comes first.

(1) Electrodes used shall conform to the description in ASTM D149-44 for thick solid materials.

B. Testing the molded parts.

1. Parts shall be tested by affixing transformer leads to adjacent electrodes, or terminal posts, or other inserts.
   a. Where only one insert is used in the part then,
      (1) Attach one lead to the single insert, another lead to the molded plastic not more than one inch from the single insert.
2. Bake the part to be tested for 30' at 180° F., plus or minus 2°F. in a dry circulating oven.
3. Immediately following the baking period, subject the part to 12,000 volts, RMS, 60 cycles, at an ambient temperature of 180°F., plus or minus 2°F. for one hour or failure which ever comes first.

PLASTIC FILMS—

M. R. GEROW, Chairman

The National Association of Furniture Manufacturers forwarded a letter to the Society of Plastics Engineers on October 7, 1949, which is quoted in its entirety:

"Several of our members who manufacture dining room and breakfast set tables have reported to us that when plastic film covers are employed as a protection in home use the varnish or lacquer finish is softened as the result of some chemical action. They have asked for an explanation of this and suggestions for safeguards that may be taken.

"Presumably, this problem has come to the attention of your organization and we shall appreciate receiving any information you have on this matter if it is one that falls within your field of activities. Some of our members have suggested that a tag or label be attached to all articles warning against the use of all plastic film covers. If this were done, it might condemn all such covers, whereas the trouble may be traceable only to certain types of film. Our people would want to guard against doing anything that would harm the reputation of films that are not trouble-making."

This Committee has attempted to obtain from the industry the necessary test procedures now used and to correlate them into a standard procedure. While there is some similarity between test procedures, they are not alike and the work is being carried on with the following companies:

The Bolta Company
Columbus Coated Fabrics Corporation
Commercial Solvents Corporation
Firestone Plastics Company
B. F. Goodrich Chemical Company
Goodyear Tire & Rubber Company
Hercules Powder Company
The Glenn L. Martin Company
Respro Inc.
Rohm & Haas Company
The Society of the Plastics Industry
Socony-Vacuum Oil Company, Inc.
Textileather
U. S. Testing Company

We believe that this report will be concluded in the first quarter of 1950, and should again set a precedent in the work of this committee.

No details of the present test methods used are included since no conclusion has been drawn and further work is necessary. An interim report will be made for publication in the SPE Journal as soon as the report can be completed.

Durez Markets Water Proof Plastic for Washing Machine Trade

A new phenolic molding compound especially formulated for molding washing machine agitators or parts operating under similar conditions has just been announced by Durez Plastics, New York. This material is designated as Durez 14899 Black. It has been made to meet the long-standing demand of washing machine manufacturers for a material which will have good surface luster and finish after repeated immersion in hot soap and detergent solutions. Twenty-four-hour tests in boiling soap-water solutions show no effect on finish. Durez 14899 Black is said to have faster cure and better dimensional stability than any other plastic agitator material yet available. It has high impact strength and very low moisture absorption. A similar material in scarlet is available. Complete data are available on these materials upon request.

British Industries Fair Shows Plastics

The 1950 British Industries Fair to be held at Earls Court and Olympia, London, and Castle Bromwich, Birmingham, May 8 to May 19 will reflect not only the recent technical advances in the production of finished moldings and other plastics fabrications but also the important revolution that is taking place in Britain in the production of raw materials for the plastics industry.

Five new factories are being built in Britain for producing important chemicals from petroleum by the "cracking" process, chemicals which previously had to be purchased in the United States.

New factories for the increased production of phenolic and urea resins are now working so that sources of raw materials for home use and for export are assured.

Heavy engineering in general and the foundry shop in particular visualizes another new use of the raw materials of the industry—the employment of synthetic resin not for molding, but for binding the sand-cores for molding metal castings. One of Britain's top plastic manufacturers has so specialized in what are now called synthetic adhesives that one well-known firm of automobile manufacturers has produced a car body by the use of the synthetic materials almost entirely without screws.

Polyvinyl chloride in all its forms—the hard type for chemically resistant structures, or the soft type for cables and sheet has made rapid progress.

Polythene which contributed to the high quality of Britain's equipment during the war, has been greatly developed recently.

Vacuum Slide Rule

The F. J. Stokes Machine Company, Philadelphia, Pa., have recently developed and issued the "Stokes Vacuum Calculator", a slide-rule device to easily and quickly determine the needed pump capacity to evacuate a given volume to a specified vacuum in a given time; the time required to evacuate a given volume to a specified vacuum with existing vacuum pumps; boiling points of solvents under vacuum; and capacity of round tanks in both cubic feet per foot and gallons per foot.

The "Stokes Vacuum Calculator" also includes basic conversion tables for vacuum operations and other useful data.

Copies of the "Stokes Vacuum Calculator" are available at 50c each from the F. J. Stokes Machine Company, 5900 Tabor Road, Philadelphia 20, Pa. Remittance must accompany request.

PENNSYLVANIA NOTES

By PAUL ROCHE

Word has just reached us that we have reason to envy Vince Juliante and Jack Brecker of Louis Marx Co., Erie, Penna. They have just put one of those good ideas into practice that we constantly talk about but never get around to. Just a few days ago they accepted the invitation of the Cleveland Office of Dow Chemical Co. and flew up to Midland, Mich., for a first hand view of the vast and busy polystyrene production facilities of this major producer.

Announcement has been made by two pioneer molders in this area of the addition of outsize press equipment. Scheduled for delivery this spring NOSCO Plastics and Erie Resistor Corp., both of Erie, Penna., have ordered 60 ounce injection molding machines from Watson Stillman Corp., equipped with "stuffer" to shoot up to 80 actual ounces of polystyrene. This type of machine develops clamping effort of 1100 tons as well, and has platen area by the acre to handle the large dies required for this class of commercial molding work.

Report has reached us of changes at Franklin Plastics Div'n. of Robinson Industries Inc., Franklin Pennsylvania. Dixon P. Downey has been elevated to the presidency of this company and Fred Kraft has again joined the company after a couple of years affiliation with Venango Plastics Co. in the same locality.

Ray Wingerter of NOSCO Plastics has been in Boston for several weeks for surgical treatment to control blood pressure. Having recuperated sufficiently from a strenuous and successful operation, Ray took the train to Florida on February 20th for a few weeks additional convalescence.

MIAMI VALLEY

By J. L. RUSSELL

Mr. Wyman Goss of General Electric Co. spoke to members of **MIAMI VALLEY SECTION**, S.P.E. on March 2 at a dinner meeting at the Wishing Well, Centerville, O. His subject was "Hycar Phenolic Compounds." Goss is in charge of product development and product application engineering of phenolic resins, varnishes, and molding compounds. Preceding the dinner a get-acquainted gabfest and "Meet the Mystery Man" contest were arranged by Charley Selz, Fellowship Committee Chairman. Another pleasant innovation cooked up by Charley and Marty Kasch was a tribute to the March Birthdayites. Last month's winner of the Mystery Man contest was John Fiedler, F & F Mold & Die Co.

Frank Strobino, G. E. Technical Representative, was program chairman, of the March meeting.

Program Chairman Marty Kasch has lined up some very interesting future meetings. A visit to Cincinnati Milling Machine is scheduled for April and another plant tour, this time through Sheffield Corp. is set for May. The Annual Picnic will again be held at the Terrace Park Country Club.

President Gerdes has appointed Harold Woodmansee, Monsanto Representative, as membership chairman, while to the publicity committee he has added Ralph Backschedier, David Hawk, and Richard Stockton.

We wish to pay tribute here to one of our most willing and cooperative workers, Chester Kruger. Chester was recently elected to serve as Director for the next three years but the pressure of other affiliations will prevent his giving sufficient time and effort to the job of Director—he felt that someone other than he should be on the Board. Accordingly, his resignation was regretfully accepted and Merle Nelson, popular Supt. of the Plastic Moldings Corp., Cincinnati was installed as Director.

A welcome is extended to a new member, Frank Strobino. Dick Bice, formerly of Recto Molded Products, Inc. is now associated with Formica Insulation Co., Cincinnati.

QUEBEC

On Wednesday, February 22, 1950 at C. I. L. Amphitheater, 626 Dorchester St. West, Montreal, Quebec, an excellent film program was presented at the section meeting. These were "The Shape of Things To Come", an interesting visit to a modern molding plant, and "This Is Nylon", a short film on the production and use of this versatile plastic material.

SPI COAST MEET

The Seventh Annual meet of the Society of The Plastics Industry, Inc., Pacific Coast Section was held March 2, 3, 4, 1950 at the Hotel del Coronado, Coronado, California. The Conference Committee was under Chairman Raul Rodriguez, editor of the Plastics Industry Magazine. Included among those registered for the three-day conclave were molders and processors, laminators and fabricators, distributors, materials and machinery suppliers, consultants and industrial designers.

The program included panel discussions on such timely subjects as the molding of large size plastics articles, new industrial applications, and informative labeling for consumer items; technical talks on reinforced plastics, low pressure molding, the new alklyd molding materials, and the rigid vinyls; a message on selling plastics in 1950, and new thoughts in employer-employee relations in this industry.

Buffalo Hears Nichols On Copper Molds

By EUGENE ROECK

The monthly meeting of the **BUFFALO SECTION** was held on Friday evening, February 17, at the Park Lane Restaurant, Buffalo, New York. (The regular meeting date of the Section has been changed by the new Board of Directors to the third Friday in the month.)

New officers presiding at the meeting included Alan A. Sim, Norton Laboratories, Inc., President; James V. Vevirit, James V. Vevirit and Associates, Inc., Vice President; Richard R. Van Geem, Trico Products Corp., Secretary; and Earl A. Russell, Spaulding Fibre Company, Inc., Treasurer.

1950 Committee Chairmen announced by Mr. Sim are: Elmer E. Howard, The Carborundum Company, Professional Activities; Haiman S. Nathan, Atlas Plastics, Inc., Membership: Norman E. Wahl, Cornell Aeronautical Laboratories, Credentials; Arthur G. Scutt, The Carborundum Company, Finance; J. Clarke Cassidy, Jr., Durez Plastics and Chemicals, Inc., Program; Edmond C. Leone, Curbell, Inc., House.

Charles H. Larkin, II, Michigan Molded Plastics, Inc., Historical; Ralph Rushmer, The Carborundum Company, Publicity, C. C. Pickering, Plastics Engineering Co., Educational; Eugene Roeck, Durez Plastics and Chemicals, Inc., S. P. E. Journal Reporter; and Alex DiAddario, Molds and Manufacturing, Inc., S. P. E. Journal Advertising.

Various projects organized at the first two meetings of the new Board were outlined by Mr. Sim. Included are a new membership drive combined with a meeting attendance drive sparked by a telephone-contact committee and the offering of a door prize to those attending who send in their reservation cards.

Speaker of the evening was Mr. Malcolm A. Nichols, President of Manco Products Company, Melvindale, Michigan. Mr. Nichols is one of the leading authorities on beryllium copper in the country. In his talk, he outlined the technique used by his company for producing beryllium copper molds and the results which may be expected when such tools are employed.

These molds are produced by pressure casting to extremely close tolerances from metal hobs or cavities or from patterns of wood, plaster, plastic, or other materials. Both cavities and forces can be reproduced from the pattern submitted.

Mr. Nichols brought with him a number of sample molds and spent a lively hour after the meeting answering questions concerning these.

MOLDED NYLON IS TORONTO TOPIC

By J. N. KEMPF

The Toronto Section of S. P. E. met in Room 1035, Wallberg Memorial Building, University of Toronto, the evening of January 26th. The guest speaker for the evening was Dr. J. E. Teagarden. Dr. Teagarden is a graduate of the University of West Virginia, Wainsburg College and Ohio State University. He became associated with the du Pont Technical Research Division in 1914. Since 1946 he has been closely connected with the Nylon Technical Development Division of E. I. du Pont de Nemours and Co., Inc., Arlington, New Jersey.

Dr. Teagarden's illustrated lecture concerned the mechanical and industrial application of molded nylon materials. The colored slides which were shown and described by Dr. Teagarden gave an excellent indication of molded nylon applications in quiet running, oil free bearings, cams, retaining rings, gears, as well as coil forms, zippers, etc. Dr. Teagarden emphasized that nylon in comparison with other bearing materials is cheaper on a cubic inch per dollar basis. In one instance molded nylon gears eliminated up to 12 separate machining operations. The discussion progressed in interesting stages touching on successful nylon applications in the home appliance, electrical, automotive and textile fields. A few of these interesting applications were more fully discussed and concerned the following:

(A) Roller type pump parts for water and sand mixtures comprised of nylon injection molded around bronze inserts. Such parts resisted the abrasion of the sand in the water, outwearing metal parts and doing the job more cheaply.

(B) The nylon gears in Mixmaster applications proved 10 times more wear-resistant than metal gears. They were also quieter running and required no lubrication.

(C) Elastic stop-nuts molded of nylon could be removed up to 300 times with no further loss in torque after the first removal. A mold containing 240 stop nut cavities could be operated on a 10 second cycle.

(D) In the textile industry, molded nylon has eliminated the need for lubrication in many applications thus overcoming the soiling of textiles due to oil spray. A textile spindle bolster molded of nylon operated efficiently at 12000 RPM whereas the former oil-lubricated cast iron spindle operated inefficiently at 9000 RPM. Nylon covered bobbins resisted nicking and consequently reduced fiber breakage due to abrasion.

The main advantages of Nylon were summarized as toughness, resistance to abrasion, resistance to heat, fatigue, and chemicals; good bearing characteristics and strength in thin molded sections.

At the last **TORONTO SECTION MEETING** on February 21st, in the Wallberg Memorial Building of the University of Toronto, Mr. Islyn Thomas and Mr. E. W. Spitzig were the guest speakers. Their subject was entitled "Molding Problems" and centered around hobbing of cavities, specialization of equipment and more cooperation between individual companies. The procedure in the joint talk between Mr. Thomas and Mr. Spitzig was for each to represent his side of the mold making field and derive satisfactory answers to problems through a question and answer analysis. The meeting proved to be a very interesting one for the members and guests present. A total of 22 members and guests were in attendance. Several others who would have attended this meeting were prevented from doing so due to hazardous driving conditions and a heavy wind-driven snow storm. The writer was forced to turn back after driving about 8 miles from Oshawa in an hour and a half. The next regular scheduled meeting is for March 29 or 30th at which time Mr. James Veverit of the Buffalo Section will be our guest speaker.

CENTRAL OHIO DISCUSSES STYRENE

By R. J. FRANCIS

"Some Engineering Aspects of Styrene" were presented by Edmund S. Childs, Assistant Manager of Product Development, Plastics Division, Monsanto Chemical Company, Springfield, Massachusetts to the Central Ohio Section at a meeting on February 9th at Hoffman's Gardens in Columbus.

After being introduced by Bob Williams, research director of The Ironsides Company of Columbus, Ed Childs, with data on slides, explained the superior dimensional stability of styrene molded parts and compared the low cost of styrene with other plastics and engineering materials on a cents-per-pound and on a cents-per-cubic foot basis. The influence of ambient temperature on physical properties was shown, along with data which pointed up the effect of molding conditions on physical properties. Annealing in hot air ovens or in water improves the thermal shock resistance of molded styrene parts, and several case histories were discussed, along with the kerosene test and the alternate hot and cold water cycling test used to measure the degree of stress relief. Molders can obtain colored materials for only ½ cent a pound more than standard priced crystal styrene by utilizing a new coloring blend. By taking advantage of the styrene engineering data available and by keeping abreast of the material and process improvements, the molder can continue to expand his outlets for molded parts.

Henry Kuhlman, president-elect and program chairman, announced that plans for the Plastics Forum to be held in Columbus in April are almost complete. The panel will be composed of eight men, each of whom will give a brief resume of his field, after which there will be a general discussion. An All-Ohio Golf Party is planned for June, and will probably be held in Newark.

M. W. Burkhart, president of the Central Ohio Section, has returned to Cambridge as Chief Engineer of the Cambridge Molded Plastics Company. This company specializes in large injection molded parts, particularly those for the domestic refrigerator field. For more than two years Burkhart has been operating the Plastics Design and Sales Company in Newark as an engineering, design, and consulting service for molders and users of plastics items, including many for the Crosley and Admiral refrigerators.

RETAILER TALKS PLASTICS SALES

By J. B. SMITH

The **GOLDEN GATE SECTION** of the S. P. E. has set the last Thursday of each month as their regular meeting date. The guest speaker at the Feb. 23rd meeting was Mr. Louis Kentfield. Mr. Kentfield owns a retail store that specializes in plastics. The talk was entitled "A Retailer Looks at Plastics."

A few of his recommendations to the plastic industry were: that the industry discard its "it sells" attitude, and substitute a "should it be made of plastics" for a "could it be made of plastic" analysis.

That an educational job be undertaken by the industry as a whole and that the material suppliers spend part of their advertisement fund for speakers to talk to groups of retail buyers, as well as to the consumers.

He suggested that the industry promote plastic products as quality merchandise and stop the down grading of most items. He stressed the need for accurate, informative labeling.

The 1950 officers are as follows: Clark Robinson, President; Vern Rawlins, Vice President; John G. Robb, Secretary.

Type for Stamping

BRASS or STEEL

Many Styles or Designs

Write for Catalog S

Worcester Stamp Company

19 Beacon Street Worcester 8, Mass.

S.P.E. Journal

Official Publication of The Society of Plastics Engineers, Inc.
409 Security Bank Building
Athens, Ohio

POSTMASTER: Forwarding and Return Postage Guaranteed.

NUCLEAR ENERGY AT CLEVELAND

By F. MARTIN

The February meeting was held Monday, the 27th, at Kieffer's Tavern, 2519 Detroit Ave. Paul Powers, Director of Rubber and Plastics Research at the Battelle Memorial Institute spoke on "Recent Developments in Plastics".

At the January 30th Meeting of the Cleveland-Akron Section Dr. W. L. Davidson, formerly of the Atomic Energy Commission, spoke on the subject "Atomic Energy".

Atomic (nuclear) energy is a double-edged sword. The products of nuclear fission can be employed for the benefit of man as well as his destruction. So far, the latter aspect has received major emphasis as witness Hiroshima, Nagasaki, the atomic arms race with Russia, and recent talk of producing the dreaded hydrogen (deuterium) bomb.

In spite of all this, there is much effort currently being devoted to constructive applications of nuclear energy and the by-products thereof. Radioactive materials are serving daily in the fields of medical therapy and diagnosis. Thousands of valuable experiments have been carried out in research laboratories during the past three years utilizing radio-tracers as a tool for throwing light on many obscure chemical and physical phenomena. The Atomic Energy Commission is vigorously prosecuting a four-fold reactor program which has as its goal, (a) the production of a stationary power plant operating on nuclear fuel, (b) the prototype of a nuclear powered propulsion unit for ship or submarine use and, (c) a "breeder" reactor which would make feasible the utilization of all uranium and thorium for the release of nuclear energy. If its destructive potential can but be suppressed, nuclear energy could prove an Aladdin's lamp for all mankind.

JET GUN WELDING

By W. L. ROOT, JR.

The Eastern New England Section held a meeting February 2nd at the Hotel Vendome. The speaker of the evening was Henry M. "Dick" Richardson of the consulting firm of DeBelle and Richardson, Hazardville, Conn. The address on "Welding of Plastics with the Air Jet Gun" was highlighted by a demonstration of the process as applied to polyethylene, vinyls, methacrylate and other thermoplastics by Stephen King of the staff of the firm.

PHILADELPHIA

The January meeting was held at the Philadelphia Section's new quarters in the Towne Scientific School of the University of Pennsylvania. Mr. L. F. Street of Welding Engineers, Inc., provided an interesting discussion of the extrusion equipment manufactured by his company and gave data relative to production in pounds per hour.

On February 20th at the Towne Scientific School, University of Pennsylvania Mr. Richardson of DeBell and Richardson talked on "Heat Welding of Plastics". Along with his talk, Mr. Richardson demonstrated the heat welding gun.

TOLEDO

Mr. A. R. Morse, Injection Molders Supply Company, discussed pin point molding at the February 14th meeting held at the Ownes Illinois Club Rooms on Door Street at Westwood Avenue. Mr. Morse discussed recent developments in heating equipment and machine design that makes possible this new field of high speed pin point work.

R. B. HARRISON

Richard B. Harrison, a consulting engineer in the plastics industry and former vice president of the Plaskon Division of the Libbey-Owens-Ford Glass Company, died unexpectedly of a heart ailment February 21st in Chicago.

Mr. Harrison began his career at Champion Spark Plug Co., and subsequently was affiliated with the Wilmington Co., luggage manufacturers. Mr. Harrison had served several years as the Plaskon vice president. He was a pioneer in plastics being identified with the early development of plastics and previously was factory manager of the division, before it became affiliated with L-O-F.

NORTHWESTERN PENNSYLVANIA

Mr. C. J. Snyder, of Koppers Company of Pittsburgh, spoke at the February 23rd meeting on "Field Molding Problems and Their Solutions". As a co-feature a film called "The Story of Tenite" was shown by H. M. McDaniel of Tennessee Eastman Corp.

"Who Knows and What"

To bridge the gap between existing biographical reference works, the publishers of "Who's Who in America" have recently released the first edition of a new companion reference, which they believe may reach a wider audience and someday surpass the popularity of their fat, red "Who's Who." The new volume is titled "Who Knows and What, Among Authorities, Experts, and the Specially Informed," and is designed specifically for assisting people with problems to locate someone who can help.

One section of "Who Knows and What," lists alphabetically 16,000 "knowers," their special fields and brief biographical sketches. Another section lists the 30,000 special fields of the knowers. These specialities are keyed to the individual so that a user of the book consults first the subject index, which refers him immediately to any of the knowers with special background in that field. Knowers available for consulting work are so indicated.

Compiling this first edition required two years and a special full time staff of seven, in addition to the A. N. Marquis Company's regular staff of fifty.

This first edition of "Who Knows and What" includes biographies of the following members of SPE:

Charles A. Breskin, publisher, Modern Plastics Magazine and Modern Plastics Encyclopedia, New York, N. Y.

LaVerne E. Cheyney, research director, Pollock Paper Corp., Middletown, Ohio.

John M. DeBell, president, DeBell and Richardson, Hazardville, Connecticut.

Albert G. H. Dietz, associate professor, Massachusetts Institute of Technology, Cambridge, Mass.

J. Harry Du Bois, executive engineer, Shaw Insulator Co., Irvington, N. J.

Richard J. Francis, consulting engineer, Newark, Ohio.

William C. Goggin, manager, plastics technical service, Dow Chemical Co., Midland, Michigan.

Gordon M. Kline, chief, organic plastics section, National Bureau of Standards, Washington, D. C.

Garson Meyer, chief chemist and director, Camera Works Lab, Eastman Kodak Company, Rochester, New York.

Ralph C. Osborne, director of engineering, Eureka Williams Corp., Bloomington, Illinois.

Frank W. Reinhart, National Bureau of Standards, Washington, D. C.

Earl A. Russel, chief engineer, Spaulding Fibre Company, Tonawanda, N. Y.

Herbert R. Simonds, consultant, New York, N. Y.

Robert C. Williams, director of research, The Ironsides Company, Columbus, Ohio.

Raymond Nauth, general manager, Ray-Metal Company, Walled Lake, Michigan.